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CONTRIBUTION OF MUSLIM SCIENTISTS TO THE WORLD:

AN OVERVIEW OF SOME SELECTED FIELDS

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ABSTRACT

Islam has its own golden history almost in every sectors of knowledge. The main theological doctrine of Islam, Al Quran also gives the utmost emphasize on pursuing knowledge. Muslim scholars from the past were very much aware of this instruction given by Allah s.w.t and they were very much captivated onto that. They developed many ideas and theories in the field of knowledge. This paper will try to shed a light on few works that have been carried out by the Muslim scholars. However, it focuses on the contributions of Muslim scholars in Mathematics, Physics and Medicine only. This paper will also promote Islamization of Knowledge and its necessity for solving current Muslim world's educational problems. It is also hoped that, by remembering all those Muslim heroes and their contributions, contemporary Muslim societies, scholars will be inspired.

INTRODUCTION

To the Muslims, history is a chain of incidents that inform the time values of Islam. It is more concentrated in knowing and "realizing" these ideologies than in nurturing uniqueness and change as essential virtues. The symbol of Islamic civilization is not a rolling river, but the dice of the Kaaba, the firmness of which represents the everlasting and incontrovertible character of Islam.

The arts and sciences in Islam are based on the idea of unity, which is the heart of the Muslim revelation. All unpretentious Islamic art, whether it be the Alhambra or the Paris Mosque, carries the plastic methods through which one can anticipate the Divine Unity manifesting itself in multiplicity, so do all the sciences that can properly be called Islamic reveal the unity of Nature. One might say that the aim of all the Islamic sciences, all the medieval and ancient cosmological sciences, is to show the unity and interrelatedness of all that exists, so that, in planning the unity of the cosmos, human being may be led to the unity of the Divine Principle, of which the unity of Nature is the image.

The story of Islamic involvement to science, technology, and entrepreneurship is a remarkable saga of new sightings in pure and applied science, technological advancement and entrepreneurship that establish the spirited and essential base of modern science, technology and business arrangements. The story of the Muslim sciences takes the form of captivation of knowledge from different civilizations, accumulating their original and significant contributions, and increasing knowledge across countries and regions through trade, cultural interactions, and education. This story is also of the saga of decline and **evisceration** of the Islamic population of the beginning in the early 17th century.

The key time periods in which it can be captured the growth and descent of the Islamic sciences are: the age of transformation of ancient texts, Greek, Chinese, Indian etc. Between the 8th and 9th centuries then came the era of original thinking and influences of the 9th and 11th centuries; this was shadowed by the weakening in intellectual and systematic thoughts until the 17th century. In contemporary world, Islam is understood as many things, but seldom viewed as a cradle of motivation and instruction. Nevertheless, it is a force of education and it is not only verses of the Quran that affirm to that fact, but also the boundless body of scholarship produced during the Middle Ages. While Europe was in the core of darkness, it was the Muslims, prompted on by the elegant of their teachings that picked up the torch of scholarship and science. It was the Muslims who well looked-after the knowledge of ancient times, expanded upon it, and finally, passed it on to Europe. It is important for contemporary Muslims to know about and appreciate the contributions of the Islamic civilization by the early Muslims. Colonialism, the organization of the Western educational model, along with Euro centrism often reveals Islam as towards the back, irreconcilable with science and technology and anti-educational. Muslim school children never acquire of their prominent past and often the only thing passed on to them is the inferiority complex. From the past it can be learnt from mistakes and use the analysis of those great examples before us as role models to enrich us in the future.

Finally, this paper will try to accomplish the goal of describing contribution of Muslim scholars in Islamic civilization but most importantly in science with a brief explanation on their work on Mathematics, Physics and Medicine. Furthermore, this study also will try to promote the methodology to gain the same influential position in the field of knowledge, science and other

fields as it was acquired by the previous Muslim scholar by discussing the definition and necessity of Islamization of Knowledge.

CONTRIBUTIONS OF MUSLIM SCHOLARS

In the seventh century A.D., the prophet Muhammad (p.b.u.h) was sent to the people of Arabia. Within a decade of his death the Muslims had conquered all of the Arabian Peninsula. Within a century, Islam had spread from Al-Hamrah in Spain to the borders of China. Islam unified science, theology, and philosophy. Muslims were commanded to study, seek knowledge, and learn and benefit from others experiences by Allah (p.b.u.h) in the holy Quran and by the prophet Muhammad (p.b.u.h) in the Sunnah. It was this that inspired the Muslims to great heights in sciences, medicine, mathematics, astronomy, chemistry, philosophy, art and architecture.

Muslim scholars commenced acquiring Greek expositions and established their study and conversion into Arabic a few centuries after the Hijrah. They significantly examined, assembled, approved and incremented the Greek science and philosophy. After this phase began what is acknowledged as the Golden Age of Islam, which remained for over two centuries. It is here we discover many of the enormous scientists of Islam who exactly left behind hundreds and thousands of books on several branches of science.

It may be notable at the first scene that the Islamic enlightened route started with "Read", follows five Quranic verses consults about science. A statistic for the number of the world "science" and its derivations in the noble Quran, it was found that it was repetitive 779 times, that is averaging 7 times a chapter. It positions the second after the word "Allah". This in fact replicates the importance of knowledge in the Islamic civilization. Prophet Muhammad (p.b.u.h) also informed that, "The Prophet Muhammad (p.b.u.h) said: "God, His angels and all those in Heavens and on Earth, even ants in their hills and fish in the water, call down blessings on those who instruct others in beneficial knowledge."(Al-Tirmidhi, Hadith 422) Consequently, Muslim scholars got this fact very well and then contributed uniquely to the humane history in terms of science in countless volumes that is can never be presented through a single study.

The contribution of Muslim scholars in science also is a vast area to discuss but this paper attempts to shed light on few sectors where Muslim scholars are still treated as the pioneer as follows:

IN MATHEMATICS

It is surprising to take into memorandum that Islam so intensely desires mankind to study and explore the universe. For example, the Holy Qur'an states:

> "We (Allah) will show you (mankind) our signs/patterns in the horizons/universe and in yourselves until you are convinced that the revelation is the truth." [Qur'an, 14:53]

This offer to discover and examine made Muslims fascinated in Mathematics, Physics, Medicine and the other sciences. The Muslims developed the symbol for zero and they systematized the numbers into the decimal system - base 10. Additionally, they designed the symbol to precise an unknown quantity, i.e. variables like x. Here we will give a short biography of these wonder full Muslim scholars who contributed in the field of Mathematics as follows:

1. **Muhammad bin Musa al-Khwarizmi**

The first great Muslim mathematician, Muhammad bin Musa al-Khwarizmi, designed the subject of algebra, which was supplementary advanced by others, most notably by Umar Khayyam. Al-Khwarizmi's work, in Latin translation, carried the Arabic numerals along with the mathematics to Europe, through Spain. The word "algorithm" is derived from his name.

Al-Khwarizmi, born in 780 A.D., was the forefather of modern Algebra. He developed sine, cosine and trigonometrically tables, which were later translated to the West. His book on algebra *"Hisab al-Jabr waal-Muqabalah"* (*The Calculation of Integration and Equation*) was used until the 16th century as the principal textbook of European universities. In it he composes that given an equation, collecting the unknowns in one side of the equation is called *al-Jabr* and collecting the known in the other side of the equation is called *al- Mukabalah*. He also described six basic types of equations: nx = m, x^2= nx, x^2=m, m+x^2 = nx, m + nx +x^2 and x^2 = m+nx. He also explained the particular equation x^2+21=10x using geometrical arguments.

Al-Khwarizmi also aided to announce Arabic numerals, the decimal position system, and the concept of zero. Algebra and Algorithm are in fact corruptions of his work and name. Interestingly, this book on algebra comprised many examples from the Islamic inheritance laws and how they could be answered using algebra. Under al-Mamun the caliph of the time, he with some others was the first to map the globe.

2. Ghiyath al-Din al- Kashani

Another exceptional mathematician was Ghiyath al-Din al-Kashani of the late fourteenth century. He functioned on the theory of numbers and techniques of computations. In 1424, he figured a value of 2pi to sixteen decimal digits of accuracy using an approximation of the circle by 805306368 side polygon. One of his most important works was *"Miftah-ul-Hissab"* or *"The Calculators' Key"*; in it he defined an algorithm for finding the fifth root of any number. The book was taught in Persian schools until the seventeenth century. Later in his life he relocated to Samarkand on the invitation of the ruler to support directly to a new scientific school and observatory and conduct research with other scholars of the time. Kashani also wrote on how to approximate sin by solving a cubic equation accurately.

3. Abu Wafa Muhammad al-Buzanji

Abu Wafa Muhammad al-Buzanji was born in Buzjan, Nishapur in 940 A. D. He became a great mathematician and astronomer at Baghdad and died in 997 A.D. Al-Buzanji's main contribution lies in several divisions of mathematics, in geometry and trigonometry especially. In geometry he added to a solution of geometrical problems with opening of the compass, construction of a square equivalent to other squares, regular polyhedral, construction of regular hexagon taking for its side of the equilateral triangle inscribed in the same circle, constructions of parabola by points and geometrical solution of the equations x4 = a and x4+ax3 = b.

Al-Buzanji's involvement to the progress of trigonometry was also widespread. He was the first person to show the generality of the sine theorem relative to spherical triangles. He established a new scheme of assembling sine tables, the value of sin 30 being correct to the eight decimal places. In addition he deliberated tangent and planned tables for them. He announced the secant and cosecant for the first time. He composed a large number of books on mathematics and other subjects, most of which have been lost or exist in modified forms. He also penned rich commentaries on Euclid and al-Khwarizmi. A substantial part of today's trigonometry can be copied back to him.

4. Abu Abdullah al- Battani

Abu Abdullah al-Battani (862-929 A.D.) was a son of a scientist and also a famous astronomer, mathematician and astrologer. He is often considered one of the greatest astronomists of Islam. In mathematics, al-Battani was the first to substitute the practice of Greek chords and the first to cultivate the concept of cotangent and provided their table in degrees. He composed a number of books on astronomy and trigonometry.

5. Mohammad Bin Ahmed

Mohammad Bin Ahmed in the tenth century invented the concept of zero or *sifr*. Thus swapping the cumbersome, Roman numerals and creating a revolution in mathematics. This directed to improvements in the calculation of the program of the worlds and progresses in the fields of astronomy and geography. Muslim mathematics had innated both the Babylonian hexadecimal system and the Indian (Hindu) decimal system, and this provided the basis for numerical techniques in mathematic. Muslims constructed mathematical models using the decimal system, conveying all numbers by means of ten symbols, and each symbol permitted the value of position as well as absolute value. Many inventive methods of doing multiplications were established by Muslims; methods of checking by casting out nines, and decimal fractions. Thus Muslim scholars added and positioned the foundations of modern mathematics and the use of mathematics in the fields of science and engineering.

6. Al-Hassan ibn al-Haytham

In seventeenth century Europe cracked the problems framed by Al- Hassan Ibn al-Haytham (965-1041) known as "Alhazen's problem". Again his work that was interpreted into Latin made Europeans aware of al- Haytham's amazing successes in the field of *Optics* "*Kitab al-Manazir"*. A theory of vision and a theory of light, and was called by his successors of the twelfth century "Ptolemy the Second". Furthermore by encouraging the use of experiments in scientific research, al-Haytham played an important role in setting the scene in modern science.

Al-Haytham's assistances to geometry and number theory went well beyond the Archimedean tradition. Al-Haytham also operated on analytical geometry and the early stages of the link between algebra and geometry. Subsequently, this work headed in pure mathematics to the harmonious fusion of algebra and geometry that was exemplified by Descartes in geometric analysis and by Newton in the calculus. Al-Haytham was a scientist who made major

contributions to the fields of mathematics, physics and astronomy during the latter half of the tenth century. John Peckham in the late-thirteenth century used al-Haytham's *Kitab al-Manazir* and Witelo's *Optics* too has echoes of *Kitab al-Manazir*.

Muslim scholars added not only to the use of logic in the development of mathematical ideas and relationships, but also to an effective system of numeration that involved zero and headed to the solution of equations. Muslims had thus begun the work that directed on to mathematical modeling and its application for the purpose of testing their theories. This knowledge and approach was slowly transferred to Europe through Spain and Sisley.

IN PHYSICS

In Compare to all sciences that developed and developed across the passage of nations and civilizations, the natural sciences of Muslims commenced by relying on the publications of the Greeks who drew on mere philosophy in their attempt to understand nature without resorting to experimentation. However, Muslim scientists spared no efforts to develop this basis; they excelled in physics in an unprecedentedly subtle and intelligent fashion to the extent that they seemed to establish a new science. For example, they made physics rely on experimentation and induction rather than on philosophy, speculations, or mere thoughts.

Muslim scientists studied acoustics, its origin and its transfer. They were the first to understand that sounds are affected by the bodies that cause them and that these sounds transfer in the air in the form of circular waves. Muslim scientists were also the first to categorize sounds into different types; they expounded that the sounds of animals differ according to the length of their necks, the width of their throats and the structure of their larynx.

Muslim scientists were also the first to interpret the occurrence of echo as a reflection of the air which hits a high mountain or wall. The reflection of the echo cannot be realized due to the spatial closeness.

1. **Abual-Rihan Al-Beruni**

Al Biruni is a renowned physicist, who determined the specific density of 18 types of precious stones. He established the rule which stated that the specific density of a body suits the volume of the water which makes it move. He also interpreted the exit of water from geysers and artesian

wells in light of the theory of communicating vessels. One of the most important of al-Biruni's many texts is Shadows which he is thought to have written around 1021. The contents of the work include the Arabic nomenclature of shade and shadows, strange phenomena involving shadows, gnomonic, the history of the tangent and secant functions, applications of the shadow functions to the astrolabe and to other instruments, shadow observations for the solution of various astronomical problems, and the shadow-determined times of Muslim prayers. Shadows are an extremely important source for our knowledge of the history of mathematics, astronomy, and physics. It also contains important ideas such as the idea that acceleration is connected with non-uniform motion, using three rectangular coordinates to define a point in 3-space, and ideas that some see as expecting the summary of polar coordinates. Topics in physics that were studied by al-Biruni comprised hydrostatics and made very accurate measurements of specific weights. He defined the ratios between the densities of gold, mercury, lead, silver, bronze, copper, brass, iron, and tin. Al-Biruni displayed the results as combinations of integers and numbers of the form 1/n, n = 2, 3, 4... 10.

2. Abu al-Fath Abd al-Rahman Mansour al-Khāzini

Abuul Fath Al-Khazni was an incomparable physicist, particularly in relation with dynamics and hydrostatics to the extent that the succeeding researchers have been startled. His theories have been still calculated in the field on kinetics at schools and universities up till now. Among these theories are the Theory of Obliquity and Inclination and the Theory of Impulse. These two theories played an important role in kinetics. A lot of historians in the field of science regard Al-Khazani the physicist of all physicists. He dedicated most of his time to study hydrostatics; he developed a device to determine the specific gravity of liquids. He further studied the issue of resistance the body faced when it got into water. Al-Khazani operated the same apparatus used by his great master Al-Beruni to determine the specific gravity of some solid and liquid materials. The measurements of Al-Khazani were so accurate that they startled his contemporaries and successors.

Al-Khazini pointed out that air had weight and power to boost things like air, adding that the weight of the object in the air weighs less than its actual weight and its condensed weight depends on the density of air. It is worth of note that these studies concreted the way for the inventions of the barometer (pressure measurement), air vacuums and pumps among others.

DISCOVERING THE LAWS OF MOTION

When considering the laws of motion among the research in physics, Muslim scientists were the first to discover these law as follows:

LAWS OF MOTION

The importance of the laws of motion lies in the fact that they are viewed as the backbone of the contemporary civilization. For example, the sciences of mobile machinery nowadays starting from the car, train, plane, space rockets, and transatlantic rockets, among others rely on these laws. They have aided man to invade the outer space and to land on the surface of the moon. Moreover, they are deemed the basis for all physical sciences which depend on motion. Optics is the motion of light, sound is the motion of light waves, and electricity if the motion of electrons…etc. It is well known in the east and the west that these laws had been revealed by the English scientist *Isaac Newton* since he published his book Principia. This fact acknowledged in the whole world and in all scientific references, including the Muslim school of course, remained till the beginning of the twentieth century when a group of contemporary physicists, most prominent Professors of Mathematics examined these laws. They checked the accessible body of Islamic manuscripts in this field and came up with the fact that Muslim scientists were the first to discover these laws. All what Newton did was to collect what had been written on these laws and formulated them in a mathematical form. Setting bias and mere theoretical speech aside, the efforts of Muslim scientists are crystal clear. They are recognized in their manuscripts which had been written seven centuries before the birth of Newton.

THE FIRST LAW OF MOTION:

The first law of motion in physics says that if the total powers that distress an object are zero, this object will stay unmoving. Likewise, a mobile object leftovers with its constant speed state unless it finds any power that shakes it, such as the friction powers. This was stated in Newton's mathematical statement when he said "In the absence of force, a body either is at rest or moves in a straight line with constant speed". When it arises to Muslim scientists and their role in this field, Avicenna in his book *"Insinuations and Notices"* (*Isharat wa Tanbihat*) identified the same law in his own words "You know if the object is left unaffected by external influence, it remains as it is". It is clear that the previous statement of Avicenna regarding the first law of

motion excelled that of Isaac Newton who appeared six centuries later. In this statement Avicenna asserts that the object remains at rest or at move with constant speed in a straight line unless external power influences it. That is to say that Avicenna was the first to discover the first law of motion.

SECOND LAW OF MOTION:

The second law of motion associates the total powers distressing an object and the increase of its speed, which is known as speed and this speed is in proportion with the volume of the power and has its same direction. According to Newton's mathematical formulation, he stated that "A body experiencing a force F experiences an acceleration a related to F by F = ma, where m is the mass of the body. Alternatively, force is proportional to the time derivative of momentum". When it comes to Muslims, Hebattullah bin Malaka Al-Baghdadi (480-560 A.H./ 1087-1164AD) indicated in his book "*The Considered in Wisdom*" (*Al-Moatabar fil Hikma*). The solidest power transfers fast and takes a short time. The stronger power leads to the faster the power and the shorter the time. If the power does not decrease, the speed does not decrease, either". In chapter fourteen entitled the Vacuum, he pointed out that "The faster the speed, the stronger the power. The stronger the power that pushes the object, the faster the speed of the object at move, and the shorter the time spent for covering the distance". This is exactly what Newton mathematically formulated and named the second law of motion.

THIRD LAW OF MOTION:

The third law of motion means that if two objects interact, the force the first object practices on the second object is called the power of the action, which is equal to the force the second object practices on the first object, but it holds the opposite direction. This power is called the force of the reaction". Newton mathematically formulated this law as follows: "Every action has a reaction which is equal in magnitude and opposite in direction".

Earlier than Newton, Abul Barakat Hebattullah bin Malaka stated in his book, The Considered in Wisdom (Al-Moatabar fil Hekma) that "In the wrestling arena, everyone has a

force practiced against the other. If one of them retreated, this does not mean that his power disappears, but this retreated power still exists, because without it the second one would not need it to influence the first one". The same meaning has been reiterated in the writings of Imam Fakhr El-Din Al-Razi in his book The Eastern Disciplines in Theology and Natural Sciences (Al-Mabaheth Al-Mashrikayyah fi Illm Al-Illaheyyat wa Al-Tabi'yyat). He pointed out that "the circle pulled by two equal forces until it stops in the middle, it is taken for granted that each forces has practiced an action that obstructs the other". The same concept has been asserted by Ibn Al-Hayytham in his book, The Scenes. He pointed out that "The moving object is encountered by an obstruction, and if this forces remains, this moving object retreats in the opposite direction in the same speed practiced by the first object and according to the power of obstruction". It is vivid clear that all what has been mentioned by Muslim scientists in these texts is the origin of the third law of motion, which was formulated by Newton after he had taken its content!

At the beginning, Muslims relied on the publications of their predecessors, such as the book entitled Nature by Aristoteles in which he dealt with kinetics and the books of Archimedes which contained information on the floating bodies in water and the specific gravity of some materials. Besides, Muslims depended on the publications of Actaspus, which entailed scientific results the uplifting pump and water clocks, and Heron of Alexandria who tackled the pulley, the wheel and the law of work. Muslim scientists spared no efforts to develop the physics- related theories and thoughts of their predecessors; they managed to introduce experimentation, which is seen as the main pillar of physics.

IN MEDICINE

In Islam, the human body is a home of indebtedness, in what way it functions, by what method to keep it fresh and safe, in what manner to prevent diseases from attacking it or remedies those diseases, have been important issues for Muslims. Prophet Muhammad (p.b.u.h) himself insisted people to *"take medicines for your diseases*", as people at that time were reluctant to do so. He also said:

> *"God created no illness, but established for it a cure, except for old age. When the antidote is applied, the patient will recover with the permission of God."*

This was solid inspiration to boost Muslim scientists to discover, progress, and spread over empirical laws. Ample considerations were specified to medicine and public health precaution. The very first hospital was constructed in Baghdad in 706 AC. The Muslims also used camel convoys as transportable hospitals, which stimulated from place to place. Ever since the religion did not prohibit it, Muslim scholars used human bodies to study anatomy and physiology and to support their students' realization on how the body works. This pragmatic study allowed surgery to mature very quickly.

1. **Abu Ali Ibn Sina**

Abu Ali Ibn Sina (980-1037), better recognized to the West as Avicenna, was conceivably the utmost physician until the contemporary epoch. His renowned book, *Al-Qanun fi al-Tibb*, stayed a typical textbook even in Europe, for over 700 years. Ibn Sina's effort is still considered and assembled upon in the East.

Other substantial offerings were made in pharmacology, such as Ibn Sina's *Kitab al-Shifa'* (Book of Healing), and in public health. The Ottomans were particularly noted for their building of hospitals and for the high level of hygiene practiced in them. Every single city in the Islamic world had a number of outstanding hospitals and many of them were specialized for particular diseases, including mental and emotional.

Abu Ali Ibn Sina, alone wrote 246 books, together with Kitab-al Shifa (*The Book of Healing*) containing 20 volumes and Al- Qanun fit Tibb (*The Canons of Medicine*). The Qanun was the principal guide for medical science in the West from the twelfth to the seventeenth century. Dr. William Osler, who wrote *The Evolution of Modern Science*, remarks "The Qanun has remained a medical Bible for a longer period than any other work". Comprising over a million words, it graphed the entire medical facts available from ancient and Muslim sources together with his innovative assistances. Ibn Sina's creative influences involved such developments such as acknowledgment of the communicable nature of phthisis and tuberculosis; spreading of diseases by water and soil and the collaboration between psychology and health. Also, the book defined over 760 medicines and became the most authentic of its era. Ibn Sina was also the first to describe meningitis and prepared ironic contributions to anatomy, gynecology and child health.

This interest in medicine went back to the time of the Prophet Mohammad (p.b.u.h), who once said that *"there is always a cure existed for every disease"*. With this essence there were hospitals and clinics built all over the Muslim world, the earliest built in 707 by Caliph Walid ibn Abd a-Malik in Damascus. Muslims equipped many developments such as the awareness of flow of blood and separation and the establishment of the first apothecary shops and the earliest school of pharmacy.

2. Abu Bakr Muhammad ibn Zakariya al-Razi

Abu Bakr Muhammad ibn Zakariya al-Razi (865-925 AD), identified as Rhazes, was one of the greatest inexhaustible Muslim doctors and perhaps second only to Ibn Sina in his endeavors. He was born at Ray, Iran and became a student of Hunayn ibn Ishaq and later a student of Ali ibn Rabban. He penned over 200 books, including *Kitab al-Mansuri*, ten volumes on Greek medicine, and *al-Hawi*, an compendium of medicine in 20 volumes. In *al-Hawi*, he encompassed every single medical subject's statistics offered from Greek and Arab sources and then added his clarifications based on his understanding and assessments. He categorized substances as vegetable, animal or mineral while other alchemists divided them into "bodies", "souls" and "spirits".

Al-Razi was first positioned in control of the first Royal Hospital at Ray, from where he quickly moved to a similar position in Baghdad where he remained the head of its famous Hospital for a long time. He originated a treatment for kidney and bladder stones, and clarified the nature of various infectious diseases. He also accompanied research on smallpox and measles and was the first to announce the usage of alcohol for medical purposes. An exclusive piece to his medical system was that he significantly preferred cure through accurate and controlled nourishment intake. This was pooled with his emphasizing on the impact of psychological aspects on health. He also anticipated therapies first on animals in order to assess their effects and side effects. He was also an expert surgeon and the first to use opium for anesthesia.

3. Abul Qasim al-Zahrawi

A new physician who soon tracked al-Razi was Abul Qasim al-Zahrawi (963-1013 AD) who is recognized as Albucasis to the West. A renowned surgeon in his time, at the court of Caliph al-Hakam II , students and patients flocked to him from the Muslim world and Europe. He wrote

the medical encyclopedia *al-Tasrif li man ajaz an-il-talif*, which enclosed 30 segments of surgical facts and drawings of 200 surgical tools, maximum of which he designed himself. The Encyclopedia was not only a typical one for physicians, but even five eras later it was being used as the standard textbook on surgery in universities in Europe. He also accomplished many elusive operations such as Cesareans and was also the first to use silk thread for sewing wounds.

4. Al - Idrisi

Al-Idrisi was born in Cordova, Spain in 1099. His major involvement was in medicinal plants which he labeled in many books, such as *Kitab al-Jami-li-Sifat Ashtat al-Nabatat*. He composed plants and data not described previously and compiled this to the subject of botany. From him a large number of new medicines from plants with their assessments suited to medical doctors. Al-Idrisi also prepared unique assistances to topography, as connected to economics, physical factors and cultural aspects. He penned geographical encyclopedias, the largest called *Rawd-Unnas wa Nuzhalat Nafs* (Pleasure of Men and Delight of Souls). Al-Idrisi also inscribed on the themes of fauna, zoology and therapeutically features. His work was soon translated into Latin and his books on geography especially stayed famous in the East and West for more than a few spans.

5. Abu Muhammad Ibn al-Baitar

Abu Muhammad Ibn al-Baitar was working in the field of botany, also from Spain. He was one of the paramount scientists of Muslim from Spain and one of the chief botanists and pharmacists of the Middle Ages. He travelled on many wandering voyages to gather plants as far as Africa and Asia. He composed *Kitab al-Jami al-Adiwaya al-Mufrada*, one of the supreme botanical accumulations allocating with medicinal plants in Arabic. The encyclopedia was completed of over 1,400 items, many of which were not known before. The book discussed to the works of 150 authors, mostly Arabic and cited about 20 early Greek scientists. It was translated into Latin and printed as late as 1758.

Ibn al-Baitar's works were categorized by thoughts, investigation and classification and exercised a profound influence on Eastern as well as Western botany and medicine. Even though many of his works were translated and published late in the western languages. Many earlier scientists had deliberated numerous portions of his books and quoted a number of references to

it. Medicine is regarded as one of the extensive fields of life sciences to which Muslims had noticeable influences through their prosperous cultivation. These assistances were unprecedentedly comprehensive, divergent, and educative to the amount that the spectator of these everlasting influences may have faith in that medicine had not be present earlier to the advancement of Muslims.

When Islam emerged, Arabs, during the pre-Islamic era, were familiar with this primitive medicine. Prophet Muhammad, (Peace be upon him (PBUH)) called for medication. Osama bin Sharik (May Allah be pleased with him) quoted the Prophet as saying:

> *"Seek medication because Allah has created a medication for each disease except senility"*

Prophet Muhammad (p.b.u.h) was known to strive for medication with honey, dates and natural herbs, among other materials which were known as "*Prophetic Medicine*". However, Muslim scientists did not confine themselves to "*Prophetic Medicine*"; they understood that life sciences, including medicine, necessitate constant investigation and surveillance. Muslims medical scientists were described by their understanding of specialization. They were, for example, categorized into ophthalmologists identified as (Al-Kahalyin), surgeons, practitioners of the so-called hijama, known as hajjamoun, and gynecologists, among others.

During the Abbasid era, Muslims shined in all divisions of medicine. They amended the mistakes made by their former scientists concerning various concepts. Moreover, they did not restrain themselves to sheer copying and translation; rather, they continued on doing research and remedying the errors of their ancestors.

ISLAMIZATION OF KNOWLEDGE

- **Muhammad Naqib Al- Attas says**: "The process of Islamization of knowledge requires firstly, the separation of the foreign elements and disease from the body of knowledge and secondly, the neutralized body of knowledge will be remolded in the crucible of Islam".
- **Ismail Raji Al Faruqi Says:** "It must be made clear that the "Islamization of knowledge" represents only one aspect of "Islamization". In its entirety, Islamization of knowledge" is the comprehensive, normative framework for individuals and society, for thought and action, for education and practice, for knowledge and organization, for the rulers

and the ruled, for this world and for the world to come. By applying "Islamization" to everything one does, a Muslim seeks the pleasure of Allah [p.b.u.h] by practicing what is true and just, through transformation and improvement, to achieve happiness, peace and security in this life as well as in the hereafter"**.**

Importance of Islamization of Knowledge

- To create Awareness in the Ummah of the crisis of ideas. This involves enlighten the Ummah about the place and methodologies of the crisis of Islamic thought in the perspective of its cultural and civilizational existence.

- To foster a deeper understanding of the nature of the crisis of ideas in contemporary Islamic thought, its causes, and its solutions.
- To define the critical relationship between the failure of Islamic thought and its methodology; the current absence of the Ummah as a civilization; and its failure to success as a free progressive and prosperous nation.
- To work toward reviving the ideologies of the Ummah, reinvigorating and gradually redeveloping its methodology, and elucidating its viewpoint and its intimate relationship with original Islamic goals
- To implement the requisite steps to allow the developing contemporary Islamic culture and methodology to avail themselves of the fountains of Islamic principles of legacy, as well as modern sciences and knowledge, by making them accessible and digestible to Muslim students.
- To provide help in researching, studying, and working on the methodology and its presentation, with a view toward elucidating Islamic concepts and intellectual outlook and toward laying the foundation for the evolution of Islamic social sciences and humanities.
- To prepare the requisite intellectuals cadres to broaden the field of Islamization of Knowledge through providing stipends for studies, providing academic supervision, and establishing academic programs of Islamic studies in all fields of contemporary social sciences and humanities**.**

CONCLUSION

Contribution of the Muslims to science, technology and entrepreneurship from the 8th to 16th century is a noteworthy expansion in human antiquity. The Muslim scholars not only conserved the ancient knowledge, but also they transformed it into major new contributions to the basic science and technology. The basic contributions were in fields as such; astronomy, chemistry, mathematics, philosophy, geography, and physics, which constitute the basis of modern science and technologies. Also they provided connectivity between Arab and the other parts of the world like the Far East, Middle East, and European regions by distributing knowledge.

Islamization of Knowledge (IOK) is the correct solution for our problem. It seems Islamization of Knowledge is very much essential to be established because it will dirt free the contemporary corrupted knowledge which is believed as the main reasons of Muslims' fall.

Muslim societies can embrace the spirit of scientific progress and accomplishment of early Islamic scholarship. They could receive and adapt the technological advancements of the West to address their own conditions and contribute their own discoveries through promoting Islamization of Knowledge in their education sector because it integrates between the beautiful heritages of Islam with modern science by undertaking a certain methodology. Bur certainly integrating of two types of knowledge need a qualified Islamized expert or institution which require understanding the Islamic worldview comprehensively and the Sciences of the time.

Science and technology can prosper among Muslims again, and other peoples, if the conditions for free inquiry, proper incentives, institutional support, and the benefits of science are encouraged.

REFERENCES

Abdalla, Mohamad. (2004) *The Fate of Islamic Science between the Eleventh and Sixteenth Centuries: A Comprehensive Review of Scholarship from Ibn Khaldun to the Present*. *Humanomics*. 20.3/4 26-56. Print.

Ahmad Y Hassan, (1986) *Islamic Technology: An illustrated history*, Cambridge University Press, p. 54.

Ahmad, Huma. *Muslim Contributions to Science, Philosophy, and the Arts*. *Jannah.org*. April 1997. Jannah , <http://www.jannah.org/articles/contrib.html>

Ajram, Dr. Kasem (1992), *Miracle of Islamic Science*, Appendix B, Knowledge House Publishers, ISBN 0911119434.

Ali, Syed Ameer (1891), *The Spirit of Islam* , Gorgias Press, NJ, USA.

Armstrong, Karen. (1991) Holy War: The Crusades and their Impact on Today's World. Doubleday: New York, p 64-65, 225-226.

Armstrong, Karen. *Islam: A Short History.* Random House 2002

Ashtor, E. (1976) *A Social and Economic History of the Near East in the Middle Ages.* London

Brend, Barbara. (1991*) Islamic Art*. Cambridge: Harvard University Press.

Chaney, Eric. Tolerance, Religious Competition and the Rise and Fall of Muslim Science. Harvard University, <http://www.economics.harvard.edu/faculty/Chaney/files/MuslimScience.pdf>.

Chapra, Umer M. (2000) *The Future of Economics: An Islamic Perspective.* The Islamic Foundation.

Colin Ronan, *Science: Its History and Development among World's Cultures*; New York; 1982; p.203.

Davies, Paul. (1995) *Super force: The Search for a Grand Unified Theory of Nature. Penguin*: London. p 29

Deen, Sayyed Misbah. (2007) *Science under Islam: Rise, Decline and Revival*. Lulu Edition,. Print.

Eaton, Gai. *Islam and the Destiny of Man,* The Islamic Texts Society: Cambridge, 1994.pp 32-33.

El Diwani, (2005) Rachida. *Islamic Contributions to the West*. Lake Superior State University: Print.

Fakhry, Majid. (1970) *A History of Islamic Philosophy*, New York: Columbia University Press.

Falagas, Matthew, Effie Zarkadoulia, and George samonis. (2006) *Arab Science in the Golden Age (750-1258 C.E.) and Today*. *FASEB Journal* 20. 1581-1586.

George Sarton, (1952) *A Guide to the History of Science*; Mass.; p.27-28.

Ghazanfar, S.M. (2007) *Capitalist Traditions in Early Arab-Islamic Civilization*. Muslim Heritage. Foundation for Science, Technology and Civilization,

Haye, Kh. A. (1991) *Stories of Great Muslims,* Brentwood: American Trust Publications.

Hitti, Phillip, (1970) *History of the Arabs*. 10th Edition. St. Martins Press; New York.
Irving, T.B. (1982) *The Tide of Islam,* Cedar Rapids: Igrams Press.

Hunt Janin, (2005) *The Pursuit of learning in the Islamic World 610-2003, Mcfarland company,* Inc, USA

Ismail RajÊ Al FarËqÊ, (2000) *Islamization of Knowledge*: The Problem, Principles and the Workplan General Principles and Work Plan, IIIT, Herndon, Virgenia, U.S.A.

John Hayes, (1983) *The Genius of Arab Civilization:* Source of Renaissance; MIT Press; p. 2.

John W. Draper, (1876 & 1904) *History of the Intellectual Development of Europe*, Harper & Row; Vol.2; p.42.

L. Schaya, (1978) *Contemplation and Action in Judaism and Islam*, in Y. Ibish and I. Marculescu (eds.), Contemplation and Action in World Religions, Seattle and London, , p. 173.

Maria Menocal, (1987) *The Arabic Role in Medieval Literary History*; p.13.

Michell, George. (1995) *Architecture of the Islamic World*, London: Thames and Hudson.

Mirza, Dr. Muhammad R. and Sidiiqi, Muhammad Iqbal. (1986) *Muslim Contribution to Science*, Chicago: Kazi Publications.

Nasr, Seyyed Hossein. (1994) *A Young Muslim's Guide to the Modern World,* Chicago: Kazi Publications.

Pierce Butler, (1933) *Fifteenth Century of Arabic Authors in Latin Translation*, in the McDonald Presentation Volume; Freeport, N.Y. p.63

Qadir, C.A. (1988) Philosophy *and Science in the Muslim World*, London: Croom Helm.

Robert Briffault, (1938) *The Making of Humanity*, London.

Said, Edward. (1978) *Orientalism*, Routledge & Kegan Paul: London.

Shustery, A. M. A. (1976) *Outlines of Islamic Culture,* Sh. Muhammad Ashraf: Lahore, p 152-153.

Syed Muhammad Naquib Al-Attas, (1978) *Islam and Secularism*, Islamic Youth Movement of Malaysia: Kuala Lumpur, Malaysia.

T. Arnold and A. Guillaume, (1931) *The Legacy of Islam*, Oxford University Press.

Tina Stiefel, (1989) *The Intellectual Revolution in Twelfth Century Europe*; St. Martin's Press, N.Y., p.71, 80.

W. Montgomery Watt, (1972) *Islamic Surveys: The Influence of Islam on Medieval Europe*; Edinburgh, England; p.84.