Islamic Background of Western Renaissance

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The nomadic Arabs, who rose from their desert tents, founded in remarkably short space of time, the mightiest empire of the Mediaeval era, which stretched from the shores of the Atlantic in the West to the Great Wall of China in the East. Their success in the field of territorial conquests was no more spectacular than their achievements in the realm of knowledge.

In fact they brought about the greatest revolution in the history of mankind-a revolution which embraced all aspectsof human activity. The memorable words of the Holy Prophet of Islam, "Go in quest of knowledge even unto the distant China'', awakened a spirit of enquiry among the Arabs which, hitherto lay dormant in them, The Muslims, who were the pioneers in all branches of knowledge during the Mediaeval times provided the necessary link between the ancient and modern civilizations.

The light of knowledge which illuminated the lands of Moors in Spain and Sicily, was greatly instrumental in dispelling the gloom of ignorance that had enveloped the Mediaeval Europe. "It was under the influence of Arabian and Moorish revival of culture", writes Robert Briffault in his well-known work The Making of Humanity, "and not in the 15th century, that the real renaissance took place. Spain and not Italy, was the cradle of the rebirth of Europe. After sinking lower and lower in barbarism, it had reached the darkest depths of ignorance and degradation when the cities of the Saracenic world Baghdad, Cairo, Cordova, Toledo, were growing centres of civilization and intellectual activity. It was there that the new life arose which was to grow into a new phase of human evolution. From the time when the influence of their culture made itself felt, began the stirring of a new life". Another great orientalist Philip K. Hitti, acknowledges the greatness of Arab culture when he writes in his History of the Arabs "Moslem Spain wrote one of the brightest Chapters in the intellectual history of mediaeval Europe. Between the middle of the 8th and the beginning of the 13th centuries, as we have noted before, the Arab speaking peoples were the main bearers of the torch of culture and civilization throughout the world. Moreover they were the medium through which ancient science and philosophy were recovered, supplemented and transmittedin such a way as to make possible the renaissance of western Europe. In all this Arabic Spain had a large share".?

The quest of knowledge was not confined to intellectuals only. Even the great Caliphs and their courtiers vied with each other in the patronage and pursuit of knowledge. "In the midst of all

this luxury", writes John William Draper, in his The Intellectual Development of Europe, which cannot be regarded by the historian with disdain, since in the end it produced a most important result in the South of France, the Spanish Caliphs emulating the example of their Asiatic compeers, and in this strongly contrasting with the Popes of Rome, were not only the patrons, but the personal cultivators of all the branches of human learning.

One of them was himself the author of a work on polite literature in not less than fifty volumes, another wrote a treatise on algebra. When Ziryab the musician came from the East to Spain, the Caliph Abdur Rahman rode forth to meet him in honour" Another reputed Western historian says, "The incorruptible treasures and delights of intellectual culture were accounted by the princes of Baghdad, Shiraz and Cordova, the truest and proudest pomps of their courts.

But it was not a more appanage of princely vanity that the wonderful growth of Islamic Science and learning was fostered by their patronage. They pursued culture with the personal ardour of an overmastering craving. Never before and never since, on such a scale, has the spectacle been witnessed of the ruling classes throughout the length and breadth of a vast empire given over entirely to a frenzied passion for the acquirement of knowledge. Learning seemed to have become with them the chief business of life. Caliphs and Amirs hurried from their Diwans to closet themselves in their libraries and observatories. They neglected their affairs of State to attend lectures and converse on mathematical problems with men of science".'

Western historians have purposely avoided acknowledging the debt which their modern civilization owed to the Muslims and till the beginning of the 18th century A.D., the factors which brought about the renaissance in Europe were shrouded in mystery. The greatness of Muslim achievements in diverse branches of learning was hidden behind the thick cover of Western partisanship.

Writing in his celebratedwork, The Intellectual Development of Europe, John William Draper says, "I have to deplore the systematic manner in which the literature of Europe it has contrived to put out of sight our scientific obligation to the Muhammadans. Surely they cannot be much longer hidden. Injustice founded on religious rancour and national conceit cannot be perpetuated for ever.....The Arab has left his intellectual impress on Europe, as, before long, Christendom will have to confess; he has indelibly written it on the heavens, as anyone may see who reads the names of the stars on a common celestial globe".

The fair minded Robert Briffault has more convincingly exposed the game of early historians who totally ignored the influence of Muslim culture on the revival of the West. He says, "The debt of Europe to the 'Heathen Dog', could, of course, find no place in the scheme of the Christian history, and the garbled falsification has imposed itself on all subsequent

conceptions". Even Gibbon treated Islam depreciatingly, an instance of the power of conventional tradition upon its keenest opponents. Until the last century there did not even exist anything approaching accurate knowledge of Saracenic history and culture. 'These accounts of Muhammad and Islam which were published in Europe before the beginning of the 19th century are now to be regarded simply as library curiosities'. (Prof. Bevan--Cambridge Mediaeval History). The history of the rebirth of Europe from barbarism is constantly being written without any reference, whatsoever, except to mention, the 'triumphs of the Cross over the Crescent', and 'the reclamation of Spain from the 'Moorish Yoke', to the influence of Arab Civilization--the History of the Prince of Denmark without Hamlet. Dr. Osborn Taylor has even achieved the feat of writing two large volumes on The Development of the Mediaeval Mind without betraying by a hint the existence of Muhammadan culture.

That a brilliant and energetic civilization (of the Muslims) full of creative energy should have existed side by side and in constant relation with populations sunk in barbarism (the Christian West), without exercising a profound and vital influence upon their development, would be a manifest anomaly..... "It is highly probable that but for the Arabs modern European civilization would never have arisen at all; it is absolutely certain that but for them, it would have not assumed that character which has enabled it to trascend all previous phases of evolution. For although theres not a single aspect of European growth in which the decisive influence of Islamic culture is not traceable, nowhere is it so clear and momentous as in the genesis of that power which constitutes the permanent distinctive force of the modern world and supreme source of its victory--natural science and the scientific spirit".l

Thus Christian Europe was rather slow to recognize the greatness of Islamic learning and its influence on the Revival of the West. Westerners like John Davenport, Stanley Lane Poole, M.P.E. Berthelot and more recently Holmyard, Max Meyerhof, George Sarton, Philip K. Hitti, Robert Briffault and John William Draper have gratefully acknowledged the part played by Muslims in the advancement of learning and the awakening of Europe. "Down to the 15th century", writes a western historian, "Whatever scientific activity existed in Europe was engaged in assimilating Arab learning without greatly adding to it".

Islamic Institutions

The Muslim State of Spain had cultivated a great civilization and a high degree of culture. Its well planned cities and well organised public works including the well laid out streets, parks, schools, colleges and hospitals made it a model State in the West whose phenominal cultural, industrial and social progress was viewed with wonder by the Christian visitor. The Moors had introduced beneficial irrigation systems and new crops in Spain. The high class fabrics

manufactured in their textile factories were used in the Royal Houses of Europe. Cordova, the Capital of Moorish Spain was the most cultured city of Europe. With its 113,000 houses, 21 suburbs, seventy big libraries and numerous colleges, mosques, palaces, parks and gardens it had acquired international reputation. With its well-illuminated streets, Cordova provided a striking contrast to the European cities and according to John William Draper, "Seven hundred years after this time there was not so much as one public lampin London..... In Paris, centuries subsequently, whoever stepped over his threshold on a rainy day stepped up to his ankles in mud".'

When the student of the University of Oxford abhorred baths as heathen custom the Moors enjoyed baths in luxurious establishments. Whenever the Christian rulers of European States needed an artist, physician or technical hand, they applied to the Cordova Government. "The fame of the Muslim Capital penetrated as far as the distant Germany where a Saxon nun (Hrosvitha) styled it as 'The Jewel of the World'.' The great social and cultural progress of Cordova inspired awe and admiration in the hearts of European travellers"

The Muslims of Spain had taken long strides in almost all branches of knowledge and had evolved an educational system which embraced all sciences and arts. A large number of educational institutions had sprung up in the four corners of the State including in Cordova, Granada, Toledo and Seville, where learned teachers imparted lessons in the sciences and arts. These Islamic institutions of Muslim Spain and Sicily were the cradle of modern European civilization and the training ground of persons like Roger Bacon and Gerbert Aurillec who ultimately paved the way for the renaissance of Mediaeval Europe. The Christian students enjoyed absolute religious tolerance and complete social freedom in Muslim Spain, which attracted large number of Christian students from all parts of Europe, who after completing their studies in Moorish Schools went back to their native places and taught new theories to astonished people. "From all parts of Europe", says Robert Briffault, "numerous students betook themselves to the great Arab seats of learning in the search of light which only there was to be found. Alvaro, a Cordovan Bishop, writes in the 9th century A.D. 'All the young Christians who distinguished themselves by their talent, know the language and literature of the Arabs, read and study passionately the Arab books, gather at great expense great libraries of these, and everywhere proclaim with loud voice how admirable is that literature'."'

The celebrated Gerbert of Aurillec who studied in Moorish school, brought from Spain some rudiments of astronomy and mathematics, and taught his astonished peoples from terrestrlaland celestial globes. His great knowledge which in the word of William of Malmesbury was 'Stolen from the Saracen', had made him as Pope Sylvester II.

The Jews, who soon mastered the Saracenic sciences and arts carried the Muslim theology and philosophy to the distant Benedictine monasteries and the metropolitan house of Monte Cassino, According to Alvaro, the Bishop of Cordova in the 9th century A.D., a large number 'lamented that, during his stay in Spain he had seen troops of students from Germany, France, England, flocking to the Moorish seats of learning'. In spite of the strict restrictions imposed by the orthodox Christian missionaries on the diffusion of Islamic learning in Europe it penetrated as far as distant Germany and far off England.

Frederik II, the Emperor of Italy and Sicily was accused of being a Muslim due to his patronage and love of Islamic learnings. Muslim Sicily did not lag behind in the cultivation of a high standard of civilization including the founding of big institutioas for teaching sciences and arts. Even after the fall of the Muslim State, the Norman kings of Sicily continued to patronise Muslim learnings, for which they were condemned by the Pope. Gradually the Arabic sciences and arts made their way into Europe, which led to the opening of a number of institutions in France, Germany and even in .England where Arabian sciences were taught by teachers who had learnt them in Muslim Spain and Sicily. Montpellier in the 14th century A.D., was the principal centre for the teaching of Arabian medicine and astronomy in France.

"By the close of the 13th century", writes Philip K. Hitti, "Arabic science and philosophy had been transmitted to Europe, and Spain's work as an intermediary was done. The intellectual avenue leading from the portals of Toledo through the Pyrenees wound its way through Provence and the Alpine passes into Lorraine, Germapy, and Central Europeas well as across the Channel into England".' It was in Marseilles, a French port on the Mediterranean that in 1140 A.D. Raymond prepared planetary tables based on those of Toledo. The famous Abbey of Cluny in southern France which housed a number of Spanish monks in the 12th century A.D. became an important centre for the diffusion of Arabian knowledge. As early as the 1Oth century A.D. Arabian sciences were introduced in Lorraine, which after two centuries grew into an important region for scientific study. Cities like Liege, Cologne, and Gorze provided the most congenial atmosphere for the growth of Arabian knowledge.

"From Lorraine it radiated into other parts of Germany and was transported into Norman England by men born or educated in Lorraine. Embassies between German kings in the North and Muslim rulers in Spain were frequent and intellectually fruitful. As early as 953 A.D., Otto the Great, King of the Germans, sent as an envoy a Lotharingian monk, John by name, who resided in Cordova for nearly 3 years, probably learned Arabic and brought back with him scientific manuscripts. Thus did Spanish Arabic learning premeate all Western Europe".'

The translated works of Arab scientists in botany, zoology, physics and alchemy were taught in

European universities specially those of Northern Italy and France. Jews, after Muslims,were the great exponents of Arab learning and founded schools along Spanish lines at Bari, Salerno, Tarentum and other places. Bartholo Ceuse had named 4,000 Jewish scholars scattered all over southern and western Europe who had imbibed Arab civilization and culture and were well versed in Arabian learning.

According to the Right Honourable Lecky, the author of Rationalism in Europe, "Jewish learning and Jewish genius contributed very largely to that bright, but transienf civilization which radiated from Toledo and Cordova and exercised so salutary an influence upon the belief of Europe". The educated Jews, whose medium of education in Spain was Arabic, took a leading part in the translation of Arabic works into Hebrew and other European languages. The Jewish teachers disseminated Arabian medicine and other sciences in the medical schools of Salerno and other European countries. The Jews who enjoyed complete tolerance in Muslim Spain took a lively interest in the development and popularisation of Arabian learning both during and after the Moorish regime. They were scattered all over Europe after the Ahmohadeen conquest and became the ambassadors of Arabian culture wherever they went.

French and German monks including Hildegard and Hrosvitha, the literary nuns of the Thuringian convent, learnt Arabian sciences from them. The wandering Jews founded numerous schools such as those of Kimhic and Ben Esra of Norbonne, where the diffusion ofGrabian learning was carried on through translation and teaching. A large number of these Jews accompanied William of Normandy to England where they established the first English school of science at Oxford, in which Arabian sciences were freely taught. It was in this school .that Roger Bacon learnt Arabic sciences from Jewish teachers

Translations

The Christian Scholars who had studied in the institutions of Muslim Spain translated several important works of Arab writers into European languages which provided the firm ground on which the stately edifice of Western learning was raised. During the 12th and 13th centuries A.D. the process of the diffusion of Arab sciences assumed massive scale and there were several centres in southern France for the dissemination of Arabian Culture.

Constantine, an African monk (1087 A.D.), who had acted as secretary to Robert Guiscard, translated several Arabic works including the theoretical part of Ali Ibn Abbas, al-Kitab aLMaliki. The surgical part of the book was translated into Latin by John, a disciple of Consrantine. Gerard of Cremona was one of the greatest exponents of Arabian learning. He spent more than 50 years in Muslim Spain devoting himself to the pursuit of Arabic learning and translated more than ninety Arabic works including Al-IZanun, the monumental medical

works of-Ibn Sina, Almagest of Ptolemy, Tasrif of Al-Zahrawi, ;rlI-Mansuri of Al-Razi and the astronomy of AlHaitham. Faraj ben Salim, the Sicilian Jew, translated in 1279, Al-Hawi, the well-known medical work of Al-Razi as well as Taqwim al-dbdan, written by Ibn Jazlah.

Europe is chiefly indebted for its knowledge of Arabic medicine to Constantine, Gerard of Cremona and Faraj hen Salim whose translations paved the way for the growth of medical science in the West. Adelard of Bath, attached for a considerable time to the house of Benedictine was the greatest Arabist of England who popularised Arab learning in France and England. He brought a large number of books from Cordova, which he translated and popularised in England. Of his many translated works, the outstanding are theElements ofEuclid, the astronomical tables of Majriti (1126 A.D.), the astronomical tables of AlKhwarizmi, the astronomical tables of Abu Ma'sher Jafar and many other astronomical and mathematical treatises. Toledo, after its fall into Christian hands in 1085 A.D. became an important centre for the transmission of Arabic literary treasures to the West..

Under the guidance of Archbishop Raymond I (1126--51 A.D.) there arose a regular translation deparment in which Michael Scot, Robert Chester and Gerard of Cremona made valuable translations of important Arabic works. Michael Scot (1236) who is considered as one of the founders of Latin Averroism later became the court astrologer of Frederick II of Sicily.. He translated among other works Al-Hai'a (Bitruji's astronomy), Adstotle's De Coelo et-Mundo, with Ibn Rushd's commentary, and many Arabic works on zoology. His translations of Ibn Rushd's works greatly influenced the later European philosophers. Robert Chester made the first translation of Al-Khwarini's algebra in 1145 A.D.

In 1143 he along with Hermann, the Dalmatian, completed the first translation of the Holy Quran. Gerard of Cremona was the most prolific of Toledo translators., Leorardo Fibonacci, who travelled extensively in Spain and Algeria learnt Arabic mathematical science and translated the great work of:-Al-Khwarizmi on algebra. His translated works greatly influenced later writers, hence he is considered the founder of modern mathematics in Europe.. He greatly. popularised the perfected decimal notation in Europe.

Daniel de Morley who studied astronomy and mathematics in Cordova, published a number of works and lectured at the Oxford School. Theodore of Antioch translated into Latin, an Arabic work dealing with hawking, which is considered as the first modern natural history. Abraham Ben Ezra(1167 A.D.) a Jew of Toledo translated al-Beruni's commentary on Khwarizmi's Tables. John of Seville translated among others the medical and philosophical works of al-Farghani, Abu Mahsar, Al-Kindi and Al-Ghazali. Plate and Tivoli translated the astronomy of AlBattani as well as other mathematical works.

Companus of Novara who had studied mathematics at Corodva taught the subject in Vienna. Alfonso, the sage had established schools at Toledo for the translation of Arabic works. Stephens of Egypt who received his education in Muslim Sicily translated the important medical work of al-Majusi in 1127 A,D.

Sicily stands next to Spain in the diffusion of Arab culture. Muslim learning was transmitted to Europe from Spain and Sicily. Even after the conquest of Sicily at the hands of the Normans in 1091A.D. the Christian rulers exercised great tolerance towards Muslims and contrary to their counterparts in Spain patronised Muslim culture. The superior culture of the conquered race had won the hearts of the conquerors, so much so that Roger, the first King of Sicily and his successors were accused of being more Muslim than Christian. Sicily, which even in the Christian era continued to be a great centre of Muslim civilization, played a vital part in the awakening of Europe. The civil administration of Sicily served as a model for Europe. It was Thomas Burn, who introduced the English fiscal system during the reign of Henry II, which he had learnt in Muslim Sicily. Sicily, with its central position served as an intermediary between the two cultures, Christian and Muslim.

It provided an ideal centre for the dissemination of Arabic civilization. There was continuous intercourse between the two Norman States of England and Sicily which was instrumental in bringing many elements of Muslim culture to distant Britain. Emperor Frederick II, in spite of strong opposition from-the orthodox quarters, continued to be the greatest patron of Muslim culture in Europe. "Its great far-reaching influence reached its height when the kingdom passed into the hands of the great Italian born Emperor Frederick II," writes Robert Briffault, "whose radiant figure filled the Middle Ages with wonder.

If the name of any European sovereign deserves to be specially associated with the redemption of Christendom from barbarism and ignorance it was not that of Charlemagne, the travesty of whom in the character of a civilizer is a fulsome patriotic and ecclesiastical fiction, but that of the enlighted and enthusiatic ruler(FrederickII) who adopted Saracenic civilization and did more than any sovereignto stimulate its diffusion" The Jews of Sicily played a vital role in the diffusion of Arabian learning in Europe. Of them Farragut of Sirgent, Mese of Palermo and Faraz Ben Salem are noteworthy. The first two translated the astronomical and mediCal works of Arabs into Latin. Southern Italy which was ruled by the Norman Kings of Sicily considerably assisted in diffusing Arab culture to nor them Italy and even to central Europe. A number of translators worked in western Italy, Burgundio of Pisa (1130 A.D.) translated ten books of Galen; Bonacosa, a Jew translated the colliget of Ibn Rushd at Padua and Paravisius translated the Taysir of Ibn Johral at Venice. Due to a lack of appropriate wards, Arabic

technical words and scientific terms were adopted in Latin. Thus the Arabic words alchemy, alcohol, azure, cipher, elixir (al-Taksir) were introduced into the vocabulary of Europe and are still in use.

The work of translating Arabic works continued unabated till the middle of the 17th century A.D. Great attention was paid to the translation of Arabic chemical works. Andrea Alphago of Baluno of Italy (1520 A.D.) translated the biographical dictionary of Ibn Kifti as well as some of the important works of Galen, Ibn Sina and Ibn Rushd. A work of Abdur Rahman on music and the Pyramids was rendered into Latinby Piyare Vattier of Orleans in 1664 A.D. The period of translation was followed by a period when Arabian knowledge was systematised, assimilated and the ground prepared for the creative works which brought about the renaissance in Europe. The systematisers arranged the vast material obtained through Arabian sources and paved the way for the intellectual growth of Europe.

Among the foremost systematisers were Alexander of Halle (1245 A.D.), Robert Grosseteste (1255 A.D.), St. Thomas Acquinas (1225-75 A.D.) Albertus Magnus (1193-1290 A.D.)., Roger Bacon (1214-94 A.D.), Amold of Villanova (1255-1320A.D.), and Peter of Abano (1250-1320 A.D.). "The impulse of this intellectual activity", writes Campbell, "was derived in the main from the Arabian writers and Albertus Magnus and Rager Bacon were the eminent types of Arabo-Scholastics of the period who derived the basis of their learning from Arabian sources." Roger Bacon (1214-94 A.D.) is considered the father of the European renaissance. He was educated by Jewish teachers in the Oxford School which was established, for the propagation of Muslim science by Jews who had been driven out of Spain by the Christians and had reached England along with William of Normandy. According to M. N.. Roy,"Roger Bacon was a disciple of Arabs"..

Roger Bacon, who in the West is known as the originator of the experimental method in Europe had himself received his training from the pupils of Spanish Moors and had learnt everything from Muslim sources, The writer of the article "Roger Bacon" in the Encyclopaedia Britannica claims that it is beyond all doubt! that Rager Bacon was profoundry versed in Arabian learning and derived from it many of the germs of his philosophy." The influence of Ibn Haitham (Alhazen) on Roger Bacon is clearly visible in his works. Europe was rather slow to recognise the Islamic origin of her much advertised scientific (experimental) method. Writing in the Making of HumaaitY, R. Briffault admits that "It was under their successors at the Oxford School that Roger Bacon learned Arabic and Arabic science.

Neither Rager Bacon nor his later namesake has any title to be credited with having introduced the experimental method. Roger Bacon was no more than one of the apostles of Muslim

science and method to Christian Europe; and he never wearied of declaring that the knowledge of Arabic and Arabic science was for his contemporaries the only way to true knowledge". As a reward for his love of Arabic science, Roger Bacon was thrown into prison as a sorcerer and he died shortly after his release from 10 years imprisonment.

The Crusadeb were partly responsible for popularising Puiuslim learning in Christian Europe. The direct contacts of the Christian west with Muslims in Palestine made the Christian scholars like Raymond Lull of Catalonia (1235--1315 A. D,X realise the futility of conquering Islam by brute force and attempt to win their hearts by peaceful means. This necessitated the learning of Arabian sciences and of training Christian missionaries in Arabic culture. Such a training centre was established in Toledo in 1250 A. D. Raymond the Martin, who was the principal scholar of this school, founded a monastic college at Miramar in 1276 A.D. Probably it was Martin who influenced the ecclesiastical council of Vienna in 1311 A.D. to adopt a Resolution to create the chair of Arabic language at the Universities of Paris, Louvain and Salamanca. According to Lec Clerc, "The contacts of the Arabs with southern Italy and the Crusades contributed to the spread of Arabian medicine and culture generally in the west of Europe". Campbell also testifies to the above view when he says, "the crusaders were undoubtedly influenced by the medical and philosophical doctrines of the Arabians". The superior culture and advanced knowledge of the Arabs in several branches of learning greatly influenced the Christian crusaders when they came in direct contact with the Arabs and the works of persons like Hermon the Cripple bear testimony to this inffuence of Arab culture.

Influence on the West

The Muslims, who were pioneers in almost all branches of learning led the West in diverse spheres Of mediaeval thought. "The mission of mankind was accomplished by Muslims", writes George Sarton, The greatest philosopher, Al-Farabi was a Muslim the greatest mathematicians, Abul Kamil and Ibrahim Ibn Sina were Muslims; the greatest geographer and encyclopaedist, al-Musudi was a Muslim; the greatest historian, Al-Tabari was still a Muslim". The influence of the Muslims could be traced in almost all spheres of life in the Mediaeval West including sciences and arts, commerce and industry, music and painting. The brightest luminaries of the Mediaeval times were Jabir, Kindi, Jahiz and Baytar in sciences; Zakariya Razi, Ibn Sinaand Zahrawi in medical science; Khwarizmi, Omar Khayyam, Abul Wafa and Nasiruddin Toosi in mathematics and astrbnomy; Farabi, Ibn Sina, Ghazali, Ibn Rushd, Ibn Arabi and Fakhruddin Razi in philosophy; Tabari, Ibn Miskawayh, Ibn Athir and Ibn Khaldun in history; Masudi, Idrisi and Ibn Hauqal in geography; Farabi, Zalzal, Ziryab and Ibrahim Mausili in music; Behzad, Maani and Raza Abbasi in painting.

They have left behind on the pages of history the imprint of their genius in the respective branches of their activity. As already stated in detail in previous chapters a number of their works served as standard text books both in the West as well in the East till the beginning of the 18th century A.D.

The Arabs were the real originators of sciences in the world. Discarding the speculative method of the Greeks, they based their scientific research on observation and experiment.which gave birth to experimental method. This experimental method introduced by the Arabs was in fact, responsible for rapid advancement of science during the mediaeval times. Jabir, the father of modern chemistry was the greatest chemical scientist of the mediaeval times whose writings influenced the course of Europeam alchemy and chemistry.

The Kilab Al-Haywan written by Jahiz is an invaluable book on zoology containing germs of, later theories on evolution, adoptation and animal psychology. Ibn al-Baytar is universally acknowledged as the most eminent botanist of Mediaeval times. According to the Historians' History, it was from Ibn al-Haitham's Twilight that the illustrious Kepler took his ideas of atmospheric refraction and "it may be that Newton himself owes to the Arabs, rather than to the apple in his orchard at Woolsthorpe the first apperception of the system of the universe, for Muhammad Ben Musa seems, when writing his books on the movements of the celestial bodies and on the Force of Attraction, to have had an inkling of the great law of general harmony."

In medical science Al-Razi's AI-Hawi (Continens) in 20 volumes and Al-JudariwalHasbah (a book dealing with small-pox) which ran into more than fifty editions during 1498--1866; Ibn Sina's (Avicenna's) AI-IZanunFi Tibb (Canon) published 36 times and surgeon Zahrawi's al-Tasrif were recognised as the highest authority on medicine during the mediaeval era. Avicenna's influence on European medicine has been overwhelming.

In mathematics and astronomy, the works on algebra written by Khwarizmi and Omar Khayyam, books on geometry and trigonometryleft behind by Abul Wafa, Nasiruddin Toosi and the treatises on astronomy by Khwarizmi, Omar Khayyam, Al-Beruni and Nasiruddin Toosi are the most outstanding contributions to these sciences during the middle ages. The translation of Khwariumi's algebra marked the beginning of European algebra. The introduction of zero to arithmetic by the Arabs was a highly beneficial step towards the simplification of arithmetic. The Muslims had specialised in historiography and political science which were their favourite subjects. Tabari, the father of Arabian historiography is considered as one of the greatest historians of the mediaeval era, who has influenced the art of writing history both in the East and the West. Ibn Khaldun, the founder of the science of sociology has the unique distinction

of treating history as a science by supporting his facts with reasoning. More than any historian, Ibn Khaldun has influenced the modern thought in historiography, politics, sociologl and political economy.

Among the eminent travellers, explorers and navigators who brought the distant parts of-Mediaeval world closer through their discoveries and writings are Ibn Batuta, Masudi, Beruni, Ibn Hauqal, Moqaddasi, Sulaiman Al-Mahiri and Ibn Majid, They also paved the way for the growth of Arabian commerce which was carried on with distant parts of the known world both through land and sea routes. The products of the highly developed industries in Muslim countries found good market throughout the world.

In fine arts and music too, Muslim artists influenced their European counterparts and the musicians Farabi, Ishaq Mausili, Zalzal and Ziryab; the paihters Maani and Behzad were the greatest figures of their time in the respective spheres of theirarts. Muslims had developed a distinctive style of their own in architecture and built some of the most magnificent and beautiful buildings in the world including Alhambra, the Grand Mosque of Cordova in Spain, mosque of Ibn Tulun in Cairo, the grand mosque of Isfahan and the Taj Mahal of Agra. These are even now recognised as the architectural wonders of the world.

Thus the Muslims kept aloft the candle of civilization during the Mediaeval era and their contributions to the advancement of human progress provided the necessary link between the ancient and modern civilizations. The Islamic universities of Nizamiyah and Mustansariya at Baghdad, the Al-Azhar of Cairo, and the universities of Cordova and Salerno diffused knowledge to students composed of all communities who flocked to these seats of learning from distant parts of the world including Europe.

The four factors

The four factors, which are generally recognised by European Historians as the basis of Western Renaissance are (1) The recovery of Greek Classics, (2) The diminution of ecclesiastical authority, (3) The discovery of the New World and (4) The introduction of the Printing Press. But curiously enough these factors are more or less resulted from the impact of Islamic culture with the west. The Islamic influence may easily be trace in the birth and growth of these factors which are said to have brought about the renaissance in Europe.

As regards the Greek Classics, it is universally admitted both in the East and the West that it were the Arabs who patronised and saved them from total extinction. Hence the Greek classics existed in Arabic version only, which were later translated by the Christian scholars into European languages The Historians History admits, "They (Arabs) merit eternal gratitude for having been the preserver of the learning of Greeks and Hindus when those people were no

longer preducing anything and Europe was still too ignorant to undertake the charge of the precious Depot. Efface the Arabs from history and the Renaissance of letters will be retarded in Europe by several centuries".

Writing in the History of Medicine in the Middle Ages, Max Kahn observes, "The tolerance of Arabs was the saving grace of civilization. They relit the lamp of learning which had been extinguished in Europe, and the light of Hippocrates, Aristotle and Galen illuminated the mosques and cloisters of infidels". According to Dr. F. J. C. Hearnshaw, writer of the Chapter on "European Life and Manners" in Vol. 6 of the Universal History of the World, "Christian students repaired to Islamic schools to learn the wisdom of the ancients and to' gain the secrets of those arts and crafts which made Muhammedan Spain famous throughout the world..

It was by way of Spain that the long lost works of Aristotle reached Western Christendom, to revolutionise scholastic Philosophy and Theology." According to Stanley Lane-Poole "What mediaeval Europe knew of Greek Philosophy, Mathematics, Chemistry, Astronomy and Medicine was learned principally through Latin translations. from Arabic treatises which held their places in the schools of Europe down to the sixteenth and even well into the seventeenth century." (Chapter on "Golden Age of Arab Culture" in Vol. IV. of the Universal History of the World).

The second factor namely the diminution of religious authority in the Christian authority was caused by Reformation and Crusades. Martin Luther, who was the founder of Reformation was so much influenced by Islamic culture that he was accused of being a Muhammadan by the orthodox Christians. The Crusaders, bailing from different parts of Christian Europe came in direct contact with Muslims in the Holy Land and were deeply influenced by the Islamic culture. On return they introduced those reforms to their life which greatly weakened the hold of the Church on the common Christian. Dr. B. W. Stevenson says in the Chapter on "The Spirit and Influence of the Crusades" in Volume 3 of The Universal History of the World (7 Vols., London, 1928) : "The learning and art and science of the East, its public services and methods of government, its highly developed industries and the superior luxury and comfort of the domestic life of its upper classes, exerted a powerful and far-reaching influence upon Europe in the Crusading period.

Another historian of the Crusades, Dr. Henry Elmer Barnes, says in Vol. I. of his History of Western Civilisation "The Westerners learned many Muslim and Oriental ways and developed a taste for the luxuries of the region. All this promoted a demand for Eastern goods and accelerated the growth of commerce. The Italians, who had acted as transporting agents for

the Crusaders, took full advantage of their opportunities to build up trading relations with the East. Travel was promoted, and the explorations of Marco Polo and others followed on the heels of the Crusaders. This still further encouraged trade between Europe and the Orient. The revived trade promoted the rise of towns and a more progressive element in European life. The science and culture of the Muslims were brought back to Europe and helped to create the remarkable intellectual revival of the twelfth and thirteenth centuries"

The third factor namely the discovery of America was actually the outcome of Arab efforts. The latest researches carried on by Dr. Jeffrey, the celebrated anthropologist of South Africa has proved that Arabs discovered America five centuries ahead of C. Columbus. The fourth factor namely the invention of the Printing Press is also indirectly connected with the introduction and large scale production of paper in Europe by the Arabs. Without paper there would have been no Printing Press.