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THE ISLAMIC CIVILIZATION

Qadar Bakhsh Baloch

"Thus we have appointed you a mid-most nation, that you may be witnesses upon mankind." (Quran, 11:43)

ISLAM WAS DESTINED to be a world religion and a civilisation, stretched from one end of the globe to the other. The early Muslim caliphates (empires), first the Arabs, then the Persians and later the Turks set about to create classical Islamic civilisation. In the 13th century, both Africa and India became great centres of Islamic civilisation. Soon after, Muslim kingdoms were established in the Malay-Indonesian world, while Muslims flourished equally in China. Islamic civilisation is committed to two basic principles: oneness of God and oneness of humanity. Islam does not allow any racial, linguistic or ethnic discrimination; it stands for universal humanism. Besides Islam have some peculiar features that distinguish it form other cotemporary civilisations.

SALIENT FEATURES OF ISLAMIC CIVILISATION

MAIN CHARACTERISTICS that distinguish Islamic civilisation from other civilisations and give it a unique position can be discerned as:

- It is based on the Islamic faith. It is monotheistic, based on the belief in the oneness of the Almighty Allah, the Creator of this universe. It is characterised by submission to the will God and service to humankind. It is a socio-moral and metaphysical view of the world, which has indeed contributed immensely to the rise and richness of this civilisation.

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- It is a civilisation with a universal dimension. It is not associated with a particular geographic region, race or historical era. It is predicated on the idea that man has precedence over the rest of the creatures of Allah. All human activities should lead to the happiness and welfare of man. Any action intended to serve this goal is a God-blessed action indeed.
- It is an open civilisation and is not shy of deriving and drawing niceties of other civilisations in the past, provided they do not run counter to the spirit of Islam.[1] Islam is the most pluralist religion; it coexists with other religions, allowing full religious autonomy.
- It is a well-balanced civilisation. It insists on equilibrium between the material and the spiritual dimensions of life. In fact, this moderation is the essence of Islamic thought and civilisation. It permits of no excess, no neglect, no extremism and no recklessness—that moderation is based on a "golden mean".
- It is a perennial civilisation and will not last as long as Islam exists. So long as, it embodies the very principles of Islam, the Almighty Allah will preserve. This unique civilisation will never wither away: since, it is not a national or a racial civilisation, nor does it run counter to human nature. In any case, Islam should not be identified with Muslims. Muslims may become weak or strong but Islam would remain an everlasting guidance to humankind.

ISLAM: AN ENLIGHTENED INFLUENCE, NOT COERCIVE

THE GLOBAL CIVILISATION created by Islam succeeded in activating the mind and thought of the people who entered its fold. As a result, the nomadic, pagan Arabs became torchbearers of science and learning. The Persian civilisation gained a new momentum after embracing Islam, contributing further to the advancement of science and arts. The same can be said of Turks and other nations.

In brief, Islam was largely responsible not only for the creation of a world civilisation in which people of many different ethnic backgrounds participated and played a central role in developing

intellectual and cultural lives of theirs on a scale not witnessed before.

For nearly one thousand years Arabic remained the major intellectual and scientific language of the world. For centuries, Islam was the source of new ideas to the Greek East and Latin West. Between the 7th and 12th centuries, Islam became the centre of a brilliant civilisation and of a great scientific, philosophic and artistic culture. Islam absorbed and added its culture to the heritage of Greece, Rome, Judaism, Christianity and the Near East.

Muslims respected religious minorities within the areas they conquered. Of course, these minorities were required to recognise Islamic political rule, pay taxes and refrain from conspiracies against the Muslims.

It is the Islamic civilisation that has contributed through its achievements in the areas of medicine, pharmacy, chemistry, mathematics and physics or philosophy to the acceleration of the advent of the renaissance and the ensuing revival of different sciences, which constitute the warp and woof of the western culture.

Islamic civilisation dominated much of the Southern and parts of the Western Hemisphere between 10th and 16th centuries. However, with the rise of industrial age and the beginnings of age of colonialism, Islamic civilisation suffered a serious set back. Muslims found themselves victims to the coercive and creeping Western encroachments on their culture and civilisation.

Despite political reversals, Islam as a religion remained an important global force and is still the second largest religion, commanding the loyalties of most of the people of Asia, Africa and the Middle East.

> "It was under the influence of the Arabian and Moorish revival of culture, and in the fifteenth century, that the real renaissance took place. Spain, not Italy, was the cradle of the rebirth of Europe. After steadily sinking lower and lower into barbarianism, it had reached the darkest depth of ignorance and degradation when the cities of the Saracenic world, Baghdad, Cairo, Cordova, were growing centers 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 stirrings of a new life."[2]

THE CIVILISATION: HISTORICAL LANDMARKS

THE HISTORY of Islamic civilisation spans centuries. From 6th-7th centuries onward till date, the growth and progression of the Islamic civilisation can be determined with different landmarks, since the foundation of the metropolitan Islamic polity in Median in Arabia horizontally outside to Africa, Asian and Europe.

Medina: Capital Of The First Islamic State

THE ISLAMIC MOVEMENT, under the Holy Prophet (P.B.U.H.), inherited an Arab society that had not gone beyond the city-state structure. There was no written law, much less a constitution. Particularly in Medina there was no governing authority either hereditary or elected. There was no financial system nor any police or army. There was no concept of territorial governance or defence either.

The Prophet Muhammad (P.B.U.H.), after his arrival in Medina, invited the elders of various religious groups and tribes and suggested establishment of a city-state. All Muslims, Christians, Arabs and Jews then ratified the 'Pact of Medina', a sort of preliminary constitution. The pact transformed Medina into a small but the first ever Muslim State in the world's history. A common governance system was constituted, thereof, beyond tribal structure, transcending cultural boundaries. All religious communities were free to follow their own law and traditions thereby. Coercion in the name of religion and state was abolished. The Prophet Muhammad (P.B.U.H.) was unanimously acknowledged leader of the newly founded federation. Defence of Medina was laid down in the charter as a collective responsibility.

The Constitution of Medina is the first written civil and political law spelling out the religious autonomy and freedom. Tribal chiefs were allowed to settle their intra-tribal disputes. The Prophet (P.B.U.H.) however was to adjudicate inter-tribal disputes. Thus, the Prophet endowed the city-state with a written constitution, defining duties and determining rights both of the citizens and chiefs.

Briefly, the pact laid down the principles of defence and foreign policy; organised a system of social insurance (called '*Ma'aqil'*); recognised the Prophet Muhammad (P.B.U.H.) as the arbiter, the

adjudicator and the legislator, and; full religious freedom and autonomy was granted especially the Jews.

Islam, it may be underlined, is committed to religious pluralism and is opposed to coercion and totalitarianism.

Period of Righteous Caliphs

THE FIRST FOUR CALIPHS, who truly followed the Quran and the *Sunnah,* are known as the 'Rightly Guided Caliphs'. They are Abu Bakr, Omar, Uthman and Ali. Main characteristics of their rule are:

- assumed office only with the consent of the people and never imposed themselves through force and fraud;
- governed the people through '*shura*' (consultation) and were not inclined toward tyranny, oppression and dictatorship;
- state and its functionaries were committed to the establishment of a just moral order;
- committed to the rule of law and the constitutional order. They publicly announced that so long as they adhere to the Quran and the *Sunnah* expect the masses to assist them in the conduct of the affairs of the state;
- acknowledged that the community has a watch-dog role and if they somehow departed from the Quran and the Sunnah, they would be straightened out by the community;
- acknowledged supremacy of judiciary and took even their own cases to the courts for adjudication;
- honoured sanctity of treasury and never used a single cent for the promotion of personal cause;
- dignity and divinity of man was taken as the foundational stones of the socio-political and moral order.

Unfortunately, subsequent rulers failed to maintain these standards rule and allegiance to the Quran and the Sunnah and degenerated into dynasties and dictatorships, causing great harm to the Muslim state and society. Let us assess these dynasties in brief.

The Umayyad Dynasty

THE UMAYYAD CALIPHATE, established in 661 A.D., was to last for about a century. Damascus became capital of the Islamic world, which stretched from the western borders of China to southern France. Not only did the Islamic conquests continue during this period through North Africa to Spain and France in the West and to

Sind, Central Asia in the East. But the basic social and legal institutions of the newly founded Islamic world were also established.

The Abbasids Dynasty

The Abbasids, who succeeded the Umayyads, shifted capital to Baghdad. Baghdad soon developed into an incomparable centre of lore and learning as well as the politico-administrative pivot of a vast empire. The seat of the powerful Abbasid dynasty, Baghdad—which the U.S.A. has brutally and illegally occupied since 2003—was the world's core of arts and sciences. It contained two of the world's oldest and greatest universities, the *Nizamiyah* and the *Mustansiriyah*, which enriched Muslim civilisation and benefited the West and the rest of the world in turn.

A sophisticated banking system was established, with branches all over the world even in China, in Baghdad. A well-organised postal service, an excellent water-supply system, a comprehensive sewage system and a magnificent army of men and elephants were raised. Countless libraries and bookstores were established.

While the Abbasids ruled in Baghdad, a number of powerful dynasties, such as the Fatimids, Ayyubids and Mamluks, held power in Egypt, Syria and Palestine.

Abbasids ruled for over 500 years. Their power waned gradually. By the end, they became symbolic rulers bestowing legitimacy upon various *sultans* (kings) and princes, who wielded actual military power. When Hulagu (*Halaku Khan*), the Mongol ruler, captured Baghdad, in 1258, Abbasid Caliphate ended. His armies of mounted archers destroyed the metropolitan city, including the incomparable libraries.

The most important event of the era as far as the relation between Islam and the west is concerned were the Crusades, declared by the Pope and espoused by various European kings. Purpose of these Crusades was to recapture the 'Holy Land', especially Jerusalem, for Christianity. After initial success, as tiny European governments were established in parts of Syria and Palestine, Muslims finally prevailed. In 1187, Saladin [*Salahuddin*] Ayubi, the great Muslim leader, recaptured Jerusalem and defeated the Christian-Crusaders.

North Africa And Spain

WHEN the Abbasids captured Damascus, one of the Umayyad princes escaped into Spain, where he established an Umayyad princedom, commencing on the golden age of Islam in Spain. Cordoba became the capital and Europe's greatest city, in terms of population as well as in culture.

Meanwhile, in North Africa various local dynasties held sway until two powerful Berber dynasties succeeded in uniting much of the North Africa with Spain in 12th and 13th centuries. The Sharifids of Morocco succeeded Berbers, who still rule the country.

Whatever, Muslims' power waned in Spain with the epochal defeat of the last Muslim dynasty in Granada in 1492, ending nearly 800 years of Muslim rule in Spain to an end.

After The Mongoloid Invasion

THE MONGOLS DEVASTATED the eastern lands of Islam and ruled from the Sinai Desert to India for a century. They soon converted to Islam and were called the Il-Khanids, a Central Asian dynasty. The Timuraids replaced the Il-Khanids and ruled the area from Samarqand as capital from 1369 to 1500 A.D., delaying expansion of the Ottoman Empire.

The Ottoman Empire

THE TURKS rose to political prominence and prevailed over the whole of Anatolia and parts of Europe. In 1453, Muhammad, 'the Conqueror', captured Constantinople, putting an end to the Byzantine Empire. The Ottomans conquered much of Eastern Europe and nearly the whole of the Arab world, only Morocco and Mauritania in the West and Yemen and parts of the Arabian Peninsula remained outside.

Their power reached its zenith with Suleyman, 'the Magnificent', whose armies reached as far as Hungary and Austria. From the 17th century onward with the rise of Western European powers and later Russia, the power of the Ottomans began to wane. Nevertheless they remained a force to be reckoned with until the First World War, when they were defeated the Western nations. Soon Kamal Ataturk gained power and declared Turkey a secular state, terminating the six centuries of Ottomans rule in 1924.

Persia

WHILE the Ottomans were concerned mostly with the western front of their empire, in Persia to the east a new the Safavid dynasty ceased power in 1502. The Safavids state flourished and spanned over two centuries. Arts and literature flowered during this period. Isfahan, the capital, became one of the most beautiful cities with its blue tiled mosques and exquisite houses.

The Afghan invasion of 1736 put an end to Safavid rule and prepared the independence of Afghanistan, which occurred formally in 19th century. Persia itself fell into turmoil until Nadir Shah, reunited the country who was to conquer India later. His rule short lived. The Zand dynasty soon took over, to be overthrown by the Qajars in 1779. They ruled from Tehran until 1921 when the Pahlavis overrun their state.

India

AS FOR INDIA, Islam entered into the east of the Indus River peacefully. Gradually, Muslims gained political power beginning in the early 13th century. But this period, which marked the expansion of both Islam and Islamic culture, came to an end with the conquest of much of India in 1526 by Babur, one of the Timurid princes. He established a powerful Mogul empire, which provided rulers like Akbar, Jahangir and Shah Jahan. It evaporated with the concentration of the British power in India, finally lasted in 1857.

Malaysia And Indonesia

FARTHER EAST in the Malay world, Islam began to spread in the 12th century in northern Sumatra. Muslim kingdoms were established in Java, Sumatra and the mainland Malaysia. Despite the colonisation of the Malay lands, Islam spread in the area covering present day Indonesia, Malaysia, the southern Philippines and southern Thailand. It is still a dominating force in islands in the Farther East.

Africa

AS FAR AS Africa is concerned, Islam entered in East Africa, at the very beginning of the Islamic period, but remained confined to the coast for some times. However, only Sudan and Somaliland became Arabised and Islamised.

West Africa felt the presence of Islam through North African traders who traveled south of the Sahara. By the 14th century, there

were already Muslim princedoms in such areas as Mali and Timbuktu in West Africa. Harare in East Africa had become seats of Islamic learning.

Gradually, Islam penetrated both inland and southward. There also appeared major charismatic figures that inspired intense resistance against European domination. The process of the Islamisation of Africa did not stop during the colonial period and is continued even today with the result that most Africans are now Muslims.

ISLAM, EPISTEMOLOGY AND KNOWLEDGE

THE SEARCH for rational foundations in Islam may be regarded to have begun with the Prophet (P.B.U.H.) himself. His constant prayer was: "God! Grant me knowledge of ultimate nature of things."[3]

Islam lays equal stress on acquisitional and revelational knowledge. Acquisitional or scientific knowledge is required for the best of the world. Whilst, revelational knowledge, that is the knowledge of the ends and ideals of life, required for the best of the world Muslims are advised not to sacrifice one for the other. So long as Muslims were able to maintain this balance. The moment we lost this balance, we lost our leadership role in this world.

Islam is a religion based upon knowledge for it is ultimately knowledge of the Oneness of God, combined with faith and total commitment to Him. The Quran is calling on man to use its intellect, to ponder, to think, to know and to investigate to discover the truth. Truth according to Quran is none other than worshipping God.

The *Sunnah* too is full of references to the importance of and insistence on knowledge. Accordingly: "Seek knowledge even if you have to go to China;" "Seek knowledge from the cradle to the grave," and; "Verily the men of knowledge are the inheritors of the prophets." He had urged on Muslims to seek knowledge. That is why every traditional Muslim city possessed public and private libraries and some cities like Cordoba and Baghdad boasted of libraries with over 400,000 books. Scholars were held in the highest esteem in Islamic society.

Integration, Conservation Of The Pre-Islamic Sciences

AS ISLAM SPREAD northward into Syria, Egypt and the Persian Empire, it came face to face with the sciences of antiquity whose

heritage had been preserved in centres, that is, now part of the Islamic world. Alexandria had been a major centre of sciences and learning for centuries. The Byzantines had tried to perish the Alexandrian treasures of knowledge, before the ascendancy of Islam, bit it had not. These riches were transferred to Antioch and farther east to such cities as Edessa by eastern Christians. Moreover, the Persian King Shapur I had established *Jundishapur* in Persia as a second great centre of learning matching Antioch. Indian physicians and mathematicians as well as Christian scholars were courted.

Once Muslims established the new Islamic order, during the Umayyad period, they turned their attention to the preservation of these centres of learning and the knowledge taught and cultivated. The philosophical and scientific works were translated not only from Greek and Syriac (language of eastern Christian scholars) but Pahlavi (the scholarly language of pre-Islamic Persia) and Sanskrit. *Hunayn ibn Ishaq*, an Arab-Christian physician, and *Ibn Muqaffa,* the progenitor of a new Arabic prose style conducive to the expression of philosophical and scientific writings, are the most prominent translators.

The great movement of translation lasted from the beginning of the 8th and end of the 9th century that reached its peak with the establishment of the 'House of Wisdom' (*Bayt al-Hikmah*) by Caliph al-Ma'mun in early 9th century.

Purpose of this concerted effort was to enable the Islamic world face the challenges presented by the philosophies and sciences of antiquity and to understand and accommodate them in its own terms and trends. Important philosophical and scientific works of Aristotle and his school, of Plato, of the Pythagorean school and of Greek astronomy, mathematics and medicine were translated into Arabic. Furthermore, important works of astronomy, mathematics and medicine were translated from Sanskrit.[4] As a result, Arabic became the most important scientific language of the world for many centuries and the depository of much of the wisdom and the sciences of antiquity.

Muslims had not translated these scientific and philosophical works out of fear of political or economic domination but premised on the primacy of knowledge in Islam. These disciplines were not considered "un-Islamic", as long as, confirmed to the doctrine of God's Oneness—the heart of authentic knowledge. These

philosophies and sciences were assimilated in worldview of Islam, cultivating the Islamic sciences.

Muslims' Contributions

THE IMMENSITY of the Muslims' contributions can best be realised by recapitulating the most significant of theirs activities, considering its postive impact on Europe's struggle to break the cult of barbarism—the Dark Ages.[5]

Medical Science

SINCE, the science of medicine is important to human welfare, its advancement has been continuous from ancient times to the present day. The contribution of Muslims to this area is immense indeed. Drawing on the medical lore of the Greeks, Persians and Egyptians, the Muslim world eagerly adapted all the available knowledge in this field. Recognising importance of the medical science, the Arabs raised physicians to a high social rank, rewarding them with generous emoluments.

The science of medicine is allied, in the Muslim as in the Hellenistic world, to the study of philosophy, flourished in every caliphate and court of Islamic Empire. The Arab scientists made significant advances in the art of healing, especially in the use of curative drugs. The world's *pharmacopoeia* is rich with these discoveries. They established hospitals far and wide and provided medical care to prisoners. They made careful clinical observations of diseases. They did creative work in the field of optics. The greatest contributions of Islamic medical scientists to Europe of the middle Ages, however, were in the encyclopedic field. The Persian *Al Razi* (Rhazes in Europe: 865-925 A.D.) wrote an important encyclopedia of medicine, *Al Havi* (Continens). It sums up the knowledge of medicine possessed by the Arabs in the 10th century as gleaned from Greek, Persian and Hindu sources. It was translated and published in Sicily in 1279 A.D..

The greatest of the Muslim encyclopedists was *Ibn Sina* (Avicenna in Europe: 980-1037 A.D.). One of the world's great intellects, Avicenna had an encyclopedic mind and a photographic memory. By the age of twenty-one, he had read and absorbed all works in the royal library of the Sultan of Bukhara and presented to the world the final codification of Graeco-Arabic medical thought. Translated into Latin by Gerard of Cremona in the 12th century, this work became

the most authoritative medical text of the Middle Ages, taught as a textbook in Europe. The "materia medica" of this Canon contains some seven hundred and sixty drugs. From the 12th to 17th centuries, this work served as "a medical bible" in the West and it is still in occasional use in the Muslim East.

The medical doctrines of Galen, greatest of Greek physicians, as improved upon by the Arabs, dominated Europe through the Middle Ages. As the Renaissance brought a new awakening of the human intellect, Europe which had been stimulated by its contacts with Islamic culture proceeded on its own energy and initiative towards those discoveries that had affected the health and longevity of man upon this planet.

Chemistry

THE ARABS, upon the conquest of Alexandria in 642 A.D., fell heir to all the science of ancient Egypt as developed and reconstructed by the brilliant Hellenes of the Alexandrian period. The Egyptians had done more in the development of what is now called chemistry than any other race of ancient or classic times. The Muslims, picking up the applied science from the Alexandrians, expanded it and handed it on to Europe. The Arabic apethep of this science was '*al-chemr*' that was 'alcehmy' to medievalists of Europe.

Up to the Renaissance, *alchemy* and chemistry were synonymous. The most important discoveries in the field of chemistry were those made by the *alchemist* in his search for a formula for converting baser metals into gold. In this search for the magical creation of gold and in their researches in materia medica, the Arab chemists developed formulas for making three chief mineral acids—nitric acid, sulphuric acid and hydrochloric acid—used in the modern world. They discovered the arts of distillation, oxidation and crystallization, also making of alcohol.

In this science, as in others, Muslims developed an objective approach and experimental method as opposed to the purely speculative method of the Greeks. Europe was indebted for all of its beginnings in *alchemy* and chemistry to the chemical science of the Arabs, which they accessed through translations of Arabic works into Latin.

The father of Arabic chemistry and its greatest genius was *Jabir* (Geber). He made significant advances in the theory and practice of

his science, developing new methods for evaporation and sublimation perfecting the process of crystallisation. Translatios of his works in Latin exerted a tremendous influence in Europe until the beginning of modern chemistry.

Astronomy, Geography And Navigation

THE ARABS absorbed all the astronomical, geographical and navigational science and skill of the ancient world and set about formulating it into a practicable body of knowledge. Accepting the contention of Eristosthenes and other Greek geographers that the earth is round, the Arabs established correctly its circumference and measured quite accurately length of terrestial degrees. They devised the world's tables of latitude and longitude and worked out means of determining positions.

Navigation in the Mediterranean required only starlore. Something more was needed for navigation in the Atlantic Ocean. Muslims borrowed this something more, 'the compass', from Chinese and 'the astorabe' from Greeks. (Astrolabe is an instrument used for mappign position of stars for navigational purposes.) The Arabs were expert navigators. For millennia, they had boldly traversed the Indian Ocean in quest of trade with India and with the east coast of Africa. They dominated the Mediterranean Sea for about five centuries. They had anticipated Columbus in venturing into the Atlantic, as far perhaps as the Azores.

It was under the tutelage of these skilled Arab navigators that Prince Henry, 'the Navigator', trained his sailers, soon claiming for Portugal the best seamen and the fastest ships in Europe. Portuguese navigators became the foremost masters of nautical science of their day, possessing the most exact instruments then known. It was in Portugal and on the newly won Portuguese islands of Madeira and the Azores that Columbus studied navigation. There, the explorer sought information before setting out from Spain to find the seaway to India.

Ibn Battutah was the gretest Muslim traveller who trversed around 120,000 kilometers from Morocco to North Africa, Egypt, Arabia, Yeman, Asia Minor, Cimea, Central Asia, Byzantium, Bulgaria, Persia, to India, China, Ceylon and Sumarta back to Spain via Syria and Morroco in 1349 A.D..[6]

It is safe to say that Columbus would never have ventured forth over the Atlantic or even have conceived the idea of such a voyage without these navigational skills, which the Arabs bequeathed him, and without the revival of the Greek concept of a round earth,[7] which the Arabs restored to Europe.

The Decimal System

THE INTRODUCTION of Arabic-Hindu symbols for numerals and of positional notation (the decimal system), eabling today's elementary school children to perform operations beyond the capacities of learned mathematicians of Greek, Roman and medieval times.[8] To the Arabs belongs the credit for perserving the useful 'zero' from the heart of India, putting it to work in elaboration of the decimal system, without which the achievements of modern science would have been impossible.

It was the Hindu philosophic genius that first conceived the idea that 'nothing', represented by 'zero', could have any mathematical value. Furhter, the value of less than nothing could be indicated algebraically as negative quantities. Working on Hindu foundations, the Arabs elaborated which has become the present-day decimal system. They also introduced the Arab numerals, that is, an adaptation of the ten Hindu digits, which gradually displaced the clumsy Greek symbols and the impossible Roman numerals.

The seven centuries beginning with 800 A.D. saw a development of computational mathematics with the Islamic intellectual and logical community, surpassing achievements of the past.[9] The use of the decimal system spread gradually into Europe through the work of Leonardo of Pisa, a Latin Christian lived for years in North Africa, where he picked up the Arabic system of numerals and the use of decimals. Leonardo's work, as *the Oxford History of Technology* observers, was the most important western work by a European in which the system of numerals, then long in use by Arabic-speaking craftsmen and merchants, was expounded for technical and commercial use in the west. It took Europe three hundred years, however, to fully accept and become adept in the use of the decimal system.

Algebra

THE SCIENCE of algebra owes much to the gifted mathematicians of the Islamic era of poliical ascendancy. Its very name proves the

magnitude of this debt. For the name Algebra is derived from an Arabic '*al-gebr*' (a binding together). Though of Greek origin, algebra was greatly expanded by Muslim mathematicians. From about 800 to 1200 A.D., the Arabs evolved a more critical study of equations giving them for the first time some element of scientific treatment. Algebra was then furhter handed on to Europe via Spain and Sicily.

Paper

THE INTRODUCTION OF PAPER into the Muslim and European world was made possible when Arab conquerors overran Asia and Africa in the eighth century. In 751 A.D., Chinese attacked the Arabs in Samarkand. The attack was repulsed and the governor came across 'paper'. The governor, eagerly questioning captives taken in the battle, learned that among them were men skilled in papermaking. These artisans were sent to Persia and to Egypt to give instruction in the art of manufacturing paper from flax, rags and vegetable fibres.

The unusual interest of the Arab world in papermaking was perhaps due to the fact that they were already acquainted with Egyptian '*papyrus*' that dispalced the use of costly parchments for manuscripts and books. The methods used in manufacturing paper and papyrus were somewhat similar, escept the suprirotiy of paper for printing. Thereafter, paper found its way westward from China where it had been invented before the time of the Christ.

Papermaking was introduced into Spain in the 12th century. From Toledo, hub of paper manufacturing, it spread under the tutelage of the Moors to the Christian kingdoms of Spain. Similarly, the Muslims in Sicily taught the art of paper-making to the Italians. The earliest recorded European document on paper was order of King Roger of Sicily, 1102 A.D.. Paper mills were first set up at Fabriano, Italy, in 1276 A.D.. Bestowed with paper, Europe thus was prepared for the prodcuing volumerous books and literature in large quantities with the invetion of printing press around 1440 A.D..

Gunpowder

THE ARABS also learned from the Chinese the manufacturin go gunpowder. Howver, they put it to a use the Chinese had never conceived of. They utilised the explosive power of gunpowder for projecting a missile from an enclosed chamber. The first effective cannon was made in Egypt sometime in the 12th century. Made of wood bound with bands of metal, it discharged stone-balls. By the

middle of the 15th century, Muslims had improved the cannon so that it was employed besigign and capturing Constantinople.

The origin of small arms, the *arquebus* for instnace, is shrouded in the mists of historical uncertainty. The earliest important use of the arquebus was in Cortez's conquest of Mexico, 1519-20 A.D.. In Europe, it was first used in the Italian wars of 1522 A.D. by a corps of Spanish arquebusiers.

It would appear likely, then, that small-arms originated in Spain. Some historians place its appearance as early as 1300 A.D. No connection has yet been traced between the invention and development of linght weaponary n Spain and the invention and development of the cannon. But if the small-arm originated in Spain during a cultural period, which was Arabic-Islamic, the presumption is that it was developed logically from the Arab's previous use of gunpowder as an explosive. Moreover, the word arquebus suggests Arabic derivation.

Textiles.

The clothing worn by Europeans during the Dark Ages and most of the Medieval period was as crude as their diet was meagre. The Goths had graduated, it is true, from skins and furs to coarse clothing woven of wool and linen. The Crusaders brought back glowing accounts of the rich fabrics of the East. Soon these fabrics became a part of the regular trade building up between the port cities of Italy and the cities of the Near East. Better still, the Moors of Spain and Sicily taught the Christians of those countries their skills in textiles and taught them cultivatino of the silkworms for the production of silk.

As a result of this Arabic influence, Renaissance Europe blossomed out in delicate and lovely fabrics of delightful textures and hues, hitherto unknown to the sombre races of north Europe.

Agricultural Products

THE DIET of Medieval Europe was monotonous. It consisted chiefly of meats and bread (washed with wine, beer or ale), leeks, garlic and onions, cabbage and a few root vegetables such as carrots and beets and fruits native to Europe. The Crusaders were naturally envious of the rich and delicate tables set by the Saracens: rice cooked in many ways, served with lamb-leg or chicken; lentils and other vegetables cooked appetisingly in olive oil, and; delicious sweetmeats or fruits

unknown to Europe. Rice made a welcome addition to the diet. The new foods gradually entered Europe via Spain and Sicily. Cultivation of small fruits, suhc as cherries, peaches, apricots and gooseberries, introduced to Europe by the Arabs stimulated the European appetite.

Coffee is yet anoethr addition to the diet of Christendom that cheers but does not inebriate. As alcoholic drinks were prohibited to them, the Muslims found that they could derive a comparable enchantment from imbibing coffee made of fine powdered grounds brought to a quick boil and sipped piping hot. Those who have indulged in the East in this form of 'dolce far niente' can appreciate what coffee has meant to that Muslim world from which alcohol has been debarred for about thirteen centuries.

Coffee was introduced in Vienna in the 17th century from Yeman, its place of origin. Soon famous coffee-houses sprang up all over in Europe. The Dutch managed to smuggle the prohibited coffee plant to Java where it was extensively cultivated. Enterprising British made fortunes by raising it in Jamaica.

Sugar, which originated in India about the beginning of the Christian era was so popular that its cultivation soon spread from India eastward into China and westward into Persia. Learning from the Persians in the 10th century, the Arabs raised it extensively in Syria, Spain and Sicily. The Egyptians, believing sugar to have medicinal qualities, invented methods of refining it chemically. The Crusaders developed in the East a taste for sugar and introduced it to Christendom. For years Venice conducted a lively trade in sugar, trans-shipping it from Syria to Europe.

The Seminaries:
The Culture Of University

THE MUSLIMS, as we have seen, began to found universities in the 9th century: first in Baghdad, followed in Cairo, Fez, Cordova and other cities. The *el-Azhar* University in Cairo boasts of being the oldest existing university in the world. Founded in the 10th century, it remained the world's leading Islamic theological centre. Of late, it is updated with social and natural sciences.

The Universities of Cordova and Toledo were well known to Europeans and their hospitals were frequented by Christian princes in need of medical care, the Christian Europe could not furnish. The

first medical schools of Europe were the direct result of this Moorish influence and of great importance to the development of the scientific spirit in medieval Europe. For scientific inquiry, as it had been developed by the Greeks and Muslims, thus gained a foothold within the precincts of a Europe dominated by the Church, the theology and the ecclesiastical culture.

The first university of Europe, Salerno in Sicily, had arisen from such medical foundations—though its origing is obsecure. But it is reputed to have been founded in the 9th century by a Latin, a Greek, a Jew and a Muslim. Its textbooks were translated by Constantine, 'the African', from Arabic works that were partly original and partly translated from the Greeks and Hellenes. Salerno was eclipsed by the establishment of the University of Naples in 1224 A.D.. by Frederick II, who as we have seen was a proponent of the Muslim culture.

Machinery

MACHINERY CAN BE TRACED from its early invention by the Greeks to its current elaboration in our modern industrial age. Around the third century B.C., Archimedes discovered the principle of the lever, the pulley and the screw and demonstrated on them successfully. Hero, another Greek mechanical genius, developed the gear and the crank and summed up all the mechanical knowledge in '*Mechanics*', a three volumes treatise.

Nothing of importance was lacking for the creation of a machine age, except the will to produce it. But this inclination was totally lacking in the Greeks. Slavery was prevalent and the ancient world felt no need for laborsaving devices. Furthermore, the Greek mentality was dedicated to theory, who disdained the practical application of science.

When the Arabs in 641 A.D. conquered Egypt and took possession of Alexandria, they fell heir to what remained of Greek creativity and logic. Its influence upon them grew as their own capacity evolved. They made translations of '*Mechanics*' and applied its principles to two important inventions—the water and the wind mills.

The watermill was an improvement over the Roman waterwheel and was employed extensively to irrigate arid regions of Spain and North Africa. Its success there led to its adoption in medieval

Europe, where it was known by the Latin name '*noria*', derived from the Arabic '*naurah*'.

The windmill, as far as, can be ascertained originated within and by the Muslims. The first windmill known to history was built around 640 A.D. by order of the Caliph Omar. A few centuries later an Arab geographer reported that the windmill was used widely in Persia to pump water for irrigation. From Persia and Afganistan the windmill spread throughout the Islamic world. It ground wheat, crushed sugarcane and pumped water. Later on it came into use in Europe by way of Morocco and Spain.

CONCLUSION

A SUPERIOR CIVILISATION, once served as a magnet, attracting gifted individuals to its focus of opportunity. Beginning with the eighth century, it was the Muslim culture that became the focal centre of world progress, attracting Jews, Persians, Christians and even Turks to its fold. As Christian civilisation began its ascent, the same gravitational attraction was exerted by Rome, Florence, Paris and Oxford.

The greatest example of this gravitational pull is of course present America, 'the land of opportunity', whose progress has been assured by the combined contributions of the most ambitious and enterprising peoples of many national origins. It is more difficult to establish the causes of the decline of civilisations than to trace the reasons for their rise.

To sum up, let us envision this classic civilisation had come to a standstill. It now lacked vigour, enterprise and spirit. When there was no scientific activity in the world, Muslims picked up the threads of ancient science and technology, where and whenever, available, wocing inot a definite pattern of progress. They salvaged the science of the classic world and developed it for centuries. They enlarged the boundaries of all the technologies then known.

But they were more than mere encyclopedists. They made practical application of this knowledge to the needs of the times. It was no accident that Muslims attained such widespread prosperity and felicity.

In pursuit of these progressive goals the Muslim scientists attained an experimental objectivity that the Greeks had disdained. They introduced science and scientific outlook to the advancement of

human mind and took leap-frogs towards Bacon's noble vision of modern science: "by experimentation to discover truth and by the application of this truth to advance human progress."

This Islamic science and technology, reaching Europe via Sicily and Spain awoke it from the Dark Ages in which it was slumbering. The detailed elaboration of the actual routes by which this transference took place have only recently been outlined by historians.

A hundred years ago a statement of the full influence of the Arabic culture on Europe would have been incredible. But modern research has firmly established its incontestability. The Oxford History of Technology sums it up as follows:

> "There are few major technological innovations between 500 A.D. and 1500 that do not show some traces of the Islamic culture."

ENDNOTES

1 Iqbal, Allama Muhammad, *The Reconstruction of Religious Thought in Islam*, Ilm-o-Irfan Publishers, Lahore, 2003, p10.
2 Quoted in Brohi, Allahbukhsh K., "The Qur'an and Its Impact on Human History", from Kurshid Ahmad (ed), "Islam: Its Meaning and Message", The Islamic Foundation, London, 1982
3 Iqbal, *op cit*., p10
4 Mazhar-ul-Haq, *A Short History of Muslim Spain*, Bookland, Lahore, 2001, p445
5 Prof. Briffault in *Making of Humanity* states, "Science is the most momentous contribution of Arab civilization to the modern world."
6 .Mazhar-ul-Haq, *op cit*, p429
7 ."The Muslims recognized and accepted the sphericity of the earth, which was compared to the "Yoke of an egg". "This fact may have played an important role in the discovery of America" writes Anwar G. Chejne. See, Anwar G. Chejne, *Muslim Spain its History and Culture*, p407.
8 Morris Kline in his Mathematics in Western Culture. (Oxford Press).
9 About 1400 A.D. al-Kashi invented decimal fractions, a century and a half before Stevin began the use of them in Europe. He computed 2 pi to equal 6.281,185,107,179,580.5