

Arab Civilization: Influence on the West  
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The Arab world is both a new and an old world.

The modern Arab world is new in time, having emerged about one hundred years ago from the ruins of the defeated Ottoman Empire. It is new in political identity and composition, being composed primarily of nation-states that did not exist before the First World War. It is new in its freedom to guide its own destiny without the restraints of colonialism. It is new in its social, economic, and cultural aims and institutions and its rapid absorption of the ways of the scientific and technological world civilization.

In this atmosphere of newness, the Arab past may seem remote and irrelevant. Its achievements were made centuries ago in a world very different from the one we know today. "What has sped is dead!" (*Ma' fat mat!*) an oft-quoted Arab proverb tells us. But this is not so. The past lives on, not merely as history, but much more in the character and identity of a people. The Arab past has taught the West much, and its legacy is a resource to be honored and used in the modern age.

Just as there are those who do not realize the scope of the influence of the Arabian horse on most other breeds of horses, there are some for whom the contributions of Arab and Islamic civilization are virtually unknown. For those who treasure the horses of the desert, admiration of the horse must be combined with a knowledge of and respect for the culture that gave it a home.

### **Conquest and Culture**

The Arab conquest of the ancient world in the 7<sup>th</sup> and 8<sup>th</sup> centuries produced two momentous and enduring effects. The more immediate and dramatic was the creation of a new world state in the Mediterranean Basin and the Near East. The second effect, less rapid and tumultuous was the development of a new world culture that has deeply influenced the shape of modern times.

Much like America today, the Arab world of the 7<sup>th</sup> to the 13<sup>th</sup> centuries was a great cosmopolitan civilization. It was an enormous, unifying enterprise, one which joined the peoples of Spain and North Africa in the west with the peoples of the ancient lands of Egypt, Syria and Mesopotamia in the east.

It was the rapid expansion of Islam that initially brought this empire together. In the space of a very few years, tribes, clannishly fighting for grazing land, developed into a united people. Alliances were made; trade routes were opened; lands and peoples were welded into a new force of mutual support and death-defying discipline. Islam provided the dynamism, but it was the Arabic language that bound it together. To be Arab, then as now, was not to come from a particular race or lineage. To be Arab, like American, was (and is) a civilization and a cultural trait rather than a racial or ethnic mark. To be Arab meant to be from the Arabic-speaking world - a world of common traditions, customs and values - shaped by a single and unifying language.

The Arab civilization brought together Muslims, Christians and Jews. It unified Arabians, Africans, Berbers, Egyptians, and descendants of the Phoenicians, Canaanites, and many other peoples. This great "melting pot" was not without tensions, to be sure, but it was precisely the tension of this mixing and meeting of peoples that produced a vibrant new culture, the remarkable advances of which are sketched briefly hereafter.

### **Contributions to Civilization**

The years between the 7<sup>th</sup> and 13<sup>th</sup> centuries mark a period in history when culture and learning flourished in North Africa, Asia, Southern Europe and the Middle East. The Arab world enhanced and developed the

arts and sciences, new discoveries were made, and the heritage of the past was preserved. Indeed, during the Dark Ages of Europe, much learning was preserved for the world through the Arab libraries in the universities of Morocco (Fez), Mali (Timbuktu) and Egypt (al-Azhar), often incorporating the collections of Greek, Roman and Byzantine cultures. From this period of Arab influence, new words such as orange, sugar, coffee, sofa, satin and algebra filtered into the languages of Europe and eventually into our own.

#### Language and Calligraphy

The Arabic language developed through the centuries in what is today Saudi Arabia until, in the era immediately preceding the appearance of Islam, it acquired the form in which it is now known. Arab poets of the pre-Islamic or *Jahiliyyah* period had developed a language of amazing richness and flexibility, despite the fact that many were desert nomads with little or no formal education. For the most part, their poetry was transmitted and preserved orally. The Arabic language was then, as it is now, easily capable of creating new words and terminology in order to adapt to the demands of new scientific and artistic discoveries.

By the 11<sup>th</sup> century, Arabic had become the administrative language of vast sections of the civilized world. Drawing on Byzantine and Persian terms and its own immense inner resources of vocabulary and grammatical flexibility, Arabic was the common medium of expression from Persia to the Pyrenees--the language of kings and commoners, poets and princes, scholars and scientists.

The reason for the extensive use of Arabic dates back to the emergence of the Islamic faith in 622 A.D. The *Qur'an*, the holy book of Islam, was revealed to the Prophet Muhammad and, subsequently, recorded in Arabic. Thus, for the Muslim Arab of that time, his language and the language of God (*Allah*) were identical.

Because God (*Allah*) spoke to Muhammad in Arabic, Muslims venerated the Arabic language, and Arabic calligraphy itself became an art, an art with a remarkable history; a form with great masters and revered traditions. Just as the monks of Christian Europe in the Middle Ages spent lifetimes writing and illuminating religious manuscripts, so, too, did the Arabs devote their lives to producing elegantly handwritten copies of the *Qur'an*. It was the chief form of embellishment on all the mosques of the Arab world. The art of Arabic calligraphy was employed in many European churches, such as St. Peter's in Rome, as well. The representations of Christian saints that beautify the Capella Palatina in Palermo, bear inscriptions in early Arabic script. Cathedrals in Cordoba, Lisbon and Malaga are resplendent with its stylized patterns.

#### Literature

Arabic literature, in addition to being the crowning artistic and intellectual achievement of the Arabs, also represents one of their most enduring legacies to the West. It is an aspect of the Arab heritage which, though often neglected or given only cursory attention, offers important insights that provide a fuller understanding of Arab culture and its contributions.

The earliest known form of Arabic literature is the heroic poetry of the noble tribes of pre-Islamic Arabia. It is there that the standard Arabic form, the *qasidah*, a long poem often based on the events of a poet's life, evolved. Such poetry was transmitted and preserved orally until the latter part of the 7<sup>th</sup> century, when scholars undertook to collect and record verses that had survived in the memories of professional reciters.

In the following centuries, as the Arab way of life shifted from a nomadic mode to a more settled and sophisticated urban style, poetry and music became inseparable, giving rise to the *ghazal* traditions, most strikingly illustrated in the famous *Kitab al-Aghani*, or "Book of Songs."

For many, Abu al-Tayyib Ahmad al-Mutanabbi, may have been the greatest of all Arab poets, while the skepticism and pessimism of Abu al-'Ala al-Ma'arri (973-1057) has been a special favorite of Western

scholars.

The genius of prose at that time was Abu 'Uthman 'Umar bin Bahr al-Jahiz (776-869), the grandson of a black slave who, having received a fine education in Basra, Iraq, became one of the period's leading intellectuals. Al-Jahiz is best known for his *Kitab al-Hayawan*, an anthology of animal anecdotes, and the *Kitab al-Bukhala*, a witty and insightful study of human psychology.

Towards the end of the 9<sup>th</sup> century, history began to form a part of *belles-lettres*. The basis for historical writings in Arabic is provided by accounts of the life of the Prophet Muhammad, following the system of *isnad*,-- that is, of quoting all available authorities and establishing their reliability. Thus Arabic history was rather more accurate than it was creative. However, the Arabs produced the man whom modern scholars consider the true father of modern historiography and the science of sociology -- Ibn Khaldun (d. 1406). Ibn Khaldun was the first to recognize that events did not happen in a vacuum but depended upon an endless variety of factors, such as climate, social customs, labor conditions, food, superstitions and so on. His *Muqaddimah* is considered by many to be the most important historical work of the Middle Ages.

Arab influences in European literature began to appear in the poetry of the early Spanish and Provençal troubadours, and later in the French *fabliaux* and *contes*. No Western author expressed Europe's fascination with any aspect of Arabism in a more dramatic and poetic form than did Shakespeare. Among his most attractive characters, two are Arabs, or as he calls them "Moors": Othello, from the play of the same name and the Prince of Morocco, one of the noblest figures in The Merchant of Venice, modeled on the great sultan Ahmed al-Mansur. But, Shakespeare was not alone. Christopher Marlow introduces the Kings of Morocco and Fez" in his Tamburlaine the Great, and in 1594, George Peele's play, The Battle of Alcazar, was produced in London. There are Arab echoes in Boccaccio's Decameron; in Squires Tales, Chaucer uses a theme brought to Europe by merchants who traveled in the Middle East; Dante's Divine Comedy is replete with details of the Prophet Muhammad's ascension to heaven culled from the work of the Arab mystic Ibn Arabi.

Perhaps no work of Arabic literature, however, has stirred Western imaginations as much as The Thousand and One Nights (*Alf Layla wa Laylah*), popularly known as The Arabian Nights. The most famous element is the tale of the clever Shahrazad, who saves herself from execution by the misogynistic King Shahriyar by telling a seemingly endless series of entertaining stories. Interestingly enough, a number of the tales now associated with The Arabian Nights-- those of Ali Baba, Sindbad, and Aladdin, for example -- are late additions of one 18<sup>th</sup> century editor and translator, the French scholar Antoine Galland. Also interesting is the fact that *The Arabian Nights*, while probably primary representative of Arab literature in the West, has only recently received scholarly attention in the Arab world, where it was long considered too vernacular for serious consideration.

Arabic literature is not only the crowning artistic and intellectual achievement of the Arabs but also the enduring monument to the creative process of inter-cultural enrichment and exchange.

#### Music

Music is an integral part of daily life in the Arab world, and sensibility to its sounds and tones is deeply-rooted in the Arab personality. Musical tradition in the Arab worlds is very old, dating back to the simple sing-song recitations of tribal bards in pre-Islamic days. As they spread out into the Middle East and North Africa in the 7<sup>th</sup> and 8<sup>th</sup> centuries, the Arabs quickly added the rich and complicated scales and tones of Indian, Persian and Byzantine music and developed a unique form that has persisted to this day with only minor changes.

The leading instrument of the Arab orchestra is the 'oud. It has a half-pear-shaped body with stripes on its shell and a right angle keyboard. The instrument has a long history. Pictures of 'oud-like instruments have

been discovered on stone carvings in ancient Egypt and Mesopotamia. It was the Arabs, however, who perfected the 'oud, gave it its name and passed it on to the Western world, where it became first the lute and then the guitar and mandolin.

The *qanoon*, zither, was first developed in the Arab world during the 10<sup>th</sup> century. As early as the 12<sup>th</sup> century a related instrument to be struck rather than plucked, was introduced. Westerners know it as the dulcimer. The *rabab* was one of the contributory ancestors of the violin. It is played vertically, however, and remains a favorite of modern Middle Eastern street musicians. A later instrument, the tambourine, has found a lasting place in many parts of Europe as well as the Americas.

In addition to its instruments, the Arabs gave to the world a structure and tabulation for music that has influenced masters such as Bartok and Stravinsky.

## THE SCIENCES

### Chemistry

Chemistry, or alchemy, from the Arabic *alkimiya*, was first studied among Arabs in the 7<sup>th</sup> century by Khalid ibn Yazid ibn Muawiyya, who was familiar with the writings of the ancient Greeks on the subject. He was followed by Jabir ibn Hayyan, known to the West as Geber, whose greatest contributions were his studies in the transmutation of metals. He is credited with the discovery of red oxide, dichloride of mercury, hydrochloric acid, nitrate of silver, nitric acid, sal ammoniac, and ammonium chloride.

Muhammad ibn Zakariya al-Razi, known to Westerners as Rhazes, introduced the systematic classification of chemical substances and their reactions in a language almost entirely free from mysticism, providing much the same kind of information to be found in laboratory manuals today. Another scientist in the same tradition is Abu Ali al-Hussain ibn Sina, "Avicenna" as he was known in Europe, who has been called the "Aristotle of the Arabs." In Europe, until the 12<sup>th</sup> century, original chemical research was virtually nonexistent. Texts were, insofar as possible, translated from Arabic. When translation was troublesome, scholars contented themselves with literal renderings of terms. Thus, in the translation from Arabic to Latin, such words were often simply transliterated: e.g., camphor, borax, elixir, talc and saffron.

### Mathematics and Astronomy

In mathematics, the Arab *sifr*, or zero, provided new solutions for complicated mathematical problems. The Arabic numeral - an improvement on a Hindu concept - and the Arab decimal system facilitated the course of science. The Arabs invented and developed algebra and made great strides in trigonometry. Al-Khwarizmi, credited with the founding of algebra, was inspired by the need to find a more accurate and comprehensive method of ensuring precise land divisions so that the *Qur'an* could be obeyed in the laws of inheritance. The writings of Leonardo da Vinci, Leonardo Fibonacci of Pisa and Master Jacob of Florence show the Arab influence on mathematical studies in European universities. The reformation of the calendar, with a margin of error of only one day in 5000 years, was also a contribution of the Arab intellect, Omar Khayyam (1040-1123), best known in the west as the author of *The Rubayat*.

Like algebra, the astrolabe was improved with religious intent. It was used to chart the precise time of sunrises and sunsets, and to determine the period for fasting during the month of Ramadan. Arab astronomers of the Middle Ages compiled astronomical charts and tables in observatories such as those at Palmyra and Maragha. Gradually, they were able to determine the length of a degree, to establish longitude and latitude, and to investigate the relative speeds of sound and light. Al-Biruni, considered one of the greatest scientists of all time, discussed the possibility of the earth's rotation on its own axis - a theory proven by Galileo six centuries later. Arab astronomers such as al-Fezari, al-Farghani, and al-Zarqali added to the worlds of Ptolemy and the classic pioneers in the development of the magnetic compass and the charting of the zodiac.

## Medicine

The development, and indeed, the very creation of European medicine is unthinkable without the Arabs' contribution because its basis was the legacy of the ancient Greeks, and that legacy was unknown until it became available in Arabic translations and with the commentaries of Arab scholars. The Arabs themselves improved upon the healing arts of ancient Mesopotamia and Egypt. The previously mentioned Muhammad Ibn Zakariaya al Razi, a medical encyclopedist of the 9<sup>th</sup> century, known as Razi by the Arabs and Rhazes by medieval Europe, was an authority on contagion. Among his many medical surveys, perhaps the most famous is the *Kitab al-Mansuri*. It was used in Europe until the 16<sup>th</sup> century. Al-Razi was the first to diagnose smallpox and measles, to associate these diseases and others with contamination and contagion, and to introduce such remedies as mercurial ointment and to use animal gut for sutures.

The famous scientist-philosopher, Avicenna, Abu Ali al-Hussain Ibn Sina, was the greatest scholar of medicine in the Middle Ages. Avicenna did pioneer work in mental health and was a forerunner of today's psychotherapists. He believed that some illnesses were psychosomatic, and he sometimes led patients back to a recollection of an incident buried in the unconscious in order to explain the present ailment.

While contagious diseases, such as smallpox, cholera and bubonic plague were known to the Arabs, it was not until the 14<sup>th</sup> century, when the Great Plague ravaged the world from India and Russia across Europe, that Ibn Katib and Ibn Khatima of Granada recognized that it was spread by contagion. Another 200 years had to elapse before Gerolamo Fracastor devised a scientific formulation of contagion, and yet another 300 years before Pasteur's bacteriological discoveries. The fact remains that Ibn Khatib and Ibn Khaatima were the first to give clinical accounts of contagion.

In his book, *Kitabu'l Maliki*, 10<sup>th</sup> century al-Maglusi showed a rudimentary conception of the capillary system, several hundred years in advance of Western science. An Arab from Syria, Ibn al-Nafis, discovered the fundamental principles of pulmonary circulation, establishing himself as a forerunner of William Harvey.

Understandably, medieval Europe regarded Arab medicine with wondrous awe, and Cordoba, an Arab center for research was looked upon with admiration by educated Europeans. As a result, until the end of the 16<sup>th</sup> century, the medical curricula of European universities demanded a knowledge of Avicenna's *Canun* (*Arabian Medicine*, by Donald Campbell, London, 1926). When the leading European medical schools were established in Paris (1110), Bologna (1113) Montpellier (1181), Padua (1222) and Naples (1224) their curricula were dominated entirely by Arab medicine. It is interesting to note that these universities have remained among the leading medical schools in Europe to the present day.

Camphor, cloves, myrrh, syrups, juleps and rosewater were stocked in Arab *sydaliyah* (pharmacies) centuries ago. Herbal medicine was widely used in the Middle East, and basil, oregano, thyme, fennel, anise, licorice, coriander, rosemary, nutmeg, and cinnamon found their way through Arab pharmacies to European tables.

## Architecture

Every culture builds in its own way, borrowing from the past, developing a distinctive style, then passing on to a new age those special achievements that are proven most worthy. As with astronomy and mathematics, the great purpose of early Arab architecture was to glorify God (*Allah*). The earliest major work of Islamic architecture was undertaken during the lifetime of the Prophet Muhammad: the rebuilding of the sanctuary of the *Ka'aba* at Mecca.

Since then, Islamic architecture has created a unique design concept, style and form that have survived to this day. The principal architectural types of Islamic buildings are those of the mosque, with its minaret, the *madrassa* (school), the tomb or mausoleum, the *khan* (rest house), the fort and the palace.

At first, the Arabs adopted Greek methods of design and architectural form to suit their purposes. The Byzantine rotunda dome, for example, was used in the 7<sup>th</sup> century Mosque of 'Umar, or Dome of the Rock, in Jerusalem. They borrowed the horseshoe arch from the Romans, developed it into their own unique style, and made it an example for the architecture of Europe. The Great Mosque of Damascus, built in the early 8<sup>th</sup> century, is a beautiful illustration of the use of the horseshoe arch. The mosque of Ibn Tulun in Cairo, with its pointed arches, was the inspiration behind many magnificent cathedrals in Europe.

Arab cusp, trefoil, and ogee arches provided models for the Tudor arch, such as those used in the cathedrals of Wells in England and Chartres in France. The Muslim minaret, was itself inspired by the Greek lighthouse. The earliest known minaret at Kairouan, Tunisia is a vast, battlemented tower, while the most striking was constructed in Samarra, Iraq. It recalled the lofty, spiraling structure, called ziggurats, which the Arabs found in the ancient cities of Babylonia. In Europe, it became the campanile, famous examples of which can be seen in San Marco Square in Venice and the Palazzo Vecchio in Florence, as well as the Giralda of Seville, built originally as a minaret and completed as a bell-tower.

Designs of the Islamic mosques of Jerusalem, Mecca, Tripoli, Cairo, Damascus, and Constantinople were borrowed in the building of ribbed vaults in Europe. The Arab use of cubal transitional supports under domes was incorporated in to the cathedrals and palaces of 11<sup>th</sup> and 12<sup>th</sup> century Palermo.

Arab styles were elegant and daring. Arab designs, calligraphy, and explosions of color can be seen today in such structures as the Lion Court of the Alhambra Palace in Granada, the Great Mosque of Cordoba, and many medieval religious and civic buildings across southern Europe.

While Westerners are more familiar with the influence of Arab architecture on the Romance countries of Spain, Italy, and France, they do not always remember that the Arab empires reached into Eastern Europe and Asia, as well. Remnants of a once-powerful conquest are prevalent in Russia. The blue-tiled dome of the Mosque of Bibi Khanum, Timu's (Tamburlaine) favorite wife, as well as a complex of tombs called *Shah-i-Zinda* (The Living Prince) in Samarkand, are stunning examples of Arab elegance in architecture.

Arab civilization, then, has left a legacy of sumptuous design and unsurpassed control of space, light and engineering that continues to inspire.

#### Arts and Crafts

The classical period of Arab art, which began with the advent of Islam in the 7<sup>th</sup> century and lasted more than a thousand years, was marked by an art form that was essentially abstract and geometric. The artistic movement in Islam always favored the lacy theorizing of geometry over the realities of nature. Islam's staunch monotheism discouraged the depiction of human or animal forms in any place or object used for religious purposes, so artists limited themselves to the realm of abstraction and intricate floral designs, known as Arabesque, with Arabic script as a distinctive feature.

Because the ancient Arabs believed that the arts served God, they raised small-scale artistries to new levels of perfection. Islamic artists and artisans concentrated on woodwork, ivory inlays, glass-making, ceramics, textile weavings and rug-making. Their sense of balance and use of color were remarkable. They drew on imaginary and natural sources to arrive at pure designs and forms with which they covered both walls and objects with intricately detailed mosaics, tiles, carvings and paintings. Syrian beakers and rock crystals were in great demand in Renaissance Europe, and the Azulejos, the iridescent luster pottery from the Moorish kilns of Valencia, enjoyed great popularity.

They were masters of silk weaving, of which the cape worn by Sicily's King Robert II on his coronation is one of the best examples. Cotton muslin (from Mosul), damask linen (from Damascus) linen and Shiraz wool and fustian (from Fustat, Egypt's Islamic capital) became watchwords for quality in woven goods

across the European continent.

Moroccan tanners of the Middle Ages developed methods for tanning hides almost to the softness of silk. They used vegetable dyes that retained color indefinitely. These leathers were used for book bindings, the tooling and colored panels of which in the Arab style are still produced today in Venice and Florence.

The Arabs further developed the art of crucible steel forging. They hardened the steel, polished and decorated it with etchings, and produced tempered Damascene swords. Other works in metal, included chandeliers, ewers, salvers, jewel cases inlaid with gold and silver, and, of course, the decorated astrolabe.

#### Navigation and Geography

The world's earliest navigational and geographical charts were developed by Canaanites who, probably simultaneously with the Egyptians, discovered the Atlantic Ocean. The medieval Arabs improved upon ancient navigational practices with the development of the magnetic needle in the 9<sup>th</sup> century.

One of the most brilliant geographers of the medieval world was al-Idrisi, a 12<sup>th</sup> century scientist living in Sicily. He was commissioned by the Norman king, Roger II, to compile a world atlas, which contained seventy maps. Called *Kitabal-Rujari* (Roger's book), al-Idrisi's work was considered the best geographical guide of its time.

Ibn Battuta, an Arab, was perhaps the hardest traveler of this time. He was not a professional geographer, but in his travels by horse, camel and sailboat, he covered over 75,000 miles. His wanderings, over a period of decades at a time, took him to Turkey, Bulgaria, Russia, Persia, and central Asia. He spent several years in India, and from there was appointed ambassador to the emperor of China. After China, he toured all of North Africa and much of western Africa. Ibn Battuta's book, *Rihla* (Journey), was a rich historic resource on the politics, social conditions and economics of the places he visited.

A twenty-five year old Arab, captured by Italian pirates in 1520, has received much attention in the West. He was Hasssan al-Wazzan, who became a protégé of Pope Leo X. Leo persuaded the young man to become a Christian, gave him his own name, and later convinced him to write an account of his travels on the then almost-unknown African continent. Hassan became Leo Africanus. His book, translated into several languages, was for nearly 200 years the most authoritative source on Africa.

Also, in the 15<sup>th</sup> century, Vasco da Gama, exploring the eastern coast of Africa, was guided by an Arab pilot, Ahmed Ibn Majid, who used maps never before seen by Europeans.

#### Horticulture

The ancient Arabs loved the land, for in earth and water they saw the source of life and the greatest of God's (*Allah*) gifts. They were guided by the words attributed to the Prophet: "Whoever bringeth the dead land to life...for him is reward therein." They were pioneers in botany. In the 12<sup>th</sup> century, an outstanding reference work, *Al-Filaha*, described more than 500 different plants and methods of grafting, soil conditioning, and curing of diseased vines and trees.

The Arab contributions to food production are legion. They were able to graft a single vine so that it would bear grapes of many types. Their vineyards were the basis for the European wine industry. Peach, apricot, and loquat trees were transplanted to southern Europe by Arab soldiers. Arabs also perfected the storage of soft fruits to be eaten fresh throughout the year. The hardy olive was encouraged to grow in the sandy soils of Greece, Spain and Sicily. From India, Arabs introduced the cultivation of sugar, and from Egypt they brought cotton to European markets. "May there always be coffee at your house" was a traditional expression, wishing prosperity and the joy of hospitality for friends and sojourners. Coffee (*qahwah* - that which gives strength) finds linguistic derivatives in almost every country of the world.

Arab horticulture gave the world the fragrant flowers and herbs from which perfumes were extracted. Bulbs such as tulips were already in a highly hybridized and cultivated state when the Crusaders carried them home from Palestine. Rice, sesame, pepper, ginger, cloves, melons and shallots, as well as dates, figs, oranges, lemons and other citrus fruits, were introduced into European cuisine via the Crusaders and trade caravans of Eastern merchants.

The women of Europe borrowed from the cosmetics first prepared by the Egyptians, Syrians, and Phoenicians, including lipsticks, nail polishes, eye shadow and liner, perfumes and powders, hair dyes, body lotions and oils, even wigs. A symbol of the vanity of medieval ladies of European courts was the high-peaked, pointed cap with its trailing veil of silk. Following this fashion of Jerusalem, called the tontour, noblewomen vied for the tallest cap and the most elegant face-framing fabrics.

#### Other Sciences

For Arab contributions to engineering, one can look to the water wheel, cisterns, irrigation, fixed-level wells, and the water clock. One of the earliest philosophers, al-Kindi, wrote on specific weight, tides, light reflection and optics. Al-Haytham, known in Europe as Alhazen, wrote a book in the 10<sup>th</sup> century that explored optical illusions, the rainbow, and the camera obscura, which led to the beginnings of photographic technologies. He made discoveries in atmospheric refractions such as mirages and comets, studied the eclipse, and laid the foundation for the later development of the microscope and the telescope.

#### Conclusion

One of the hallmarks of civilized man is knowledge of the past -- the past of an individual's own family, tribe, nation, or culture; the past of others with whom one's own culture has had repeated and fruitful contact; or the past of any group that has contributed to the ascent of man. For many breeders of horses from the Arabian desert, the Arabs fit profoundly into both of the latter two categories.

The lasting impact of Arab civilization on western life, especially in the arts and sciences is indisputable. That the debt of Europe and western culture to Islam has been largely forgotten is evidence itself of how assimilated the Arab influence has been in the western world. The contribution of the Arabs and of Islamic tradition has become part and parcel of its heritage. Their legacy is that of a people who have made great contributions to mankind in the past and who fully share now in an intellectual partnership with other peoples of the West and the East that should *in sha' Allah* benefit all of us in the future.