Appendix

Let us first consider the ideas of several Western scholars on the history of science in Islamic societies:[1]

John Bernal has written:

"Islam has been the religion of science and knowledge from the very beginning. Furthermore, unlike the Roman Empire, Islamic cities did not isolate themselves from the rest of the East. Islam was where Asian and European sciences met. Thus, inventions were made that were totally unknown –or even unachievable– to Greek or Roman technology, such as steel products, silk paper and enamelled chinaware. Such inventions also led to other advances, bringing about more activity in the West and eventually the 17th and 18th industrial revolutions."[2]

Isaac Asimov explains:

"In the seventh century, the Arabs conquered Damascus, and then Egypt, thus inheriting a vast treasure of Greek knowledge and science.

This historical paint is highly significant, for if Muslims hadn't become so powerful and sophisticated, the whole civilized world might have become a battle field for barbarian tribes.

During the thousand years of the Byzantine Empire, science and technology were completely forsaken among the intense struggles and battles for power. Calinicus was the only glitter of science and wisdom in that era. Western Europe was in a deep sleep of ignorance and darkness. The Muslims were the only guardians of science. They not only saved Greek science and philosophy by translating them, but also enriched science with their amazing works of research and excellent books. Alchemy was of particular interest to them.[3]

Sigrid Hunke agrees:

"We have inherited science and technology not only from Rome and Greece, but also from the world of Islamic thought. The *West undoubtedly owes Islam a great deal."*

Philip Hitti adds:

"No civilization achieved as much scientific progress during the medieval era as the Muslims did."

John Bernal writes:

"The *Muslims were culturally independent, and received a warm welcome having conquered the Mediterranean areas... In fact, it would have been more logical to consider the history of science confined to the period between the seventh* (*1st century Hijra*) *and fourteenth centuries* ...The *basic topics* (*of Islamic culture*) *are interestingly not only worldly, but also scientific. This is why Christian universities followed Islamic methods ...It was the Muslims who taught the Europeans how to make and use paper in the 12th century.*[4]

We must remember that since the final end of Islam is achieving a *reasonable life,* posing the question whether Islam considers science necessary or not, is like asking whether Islam considers reasonable life a necessity or not, for science –discovering reality –is a part of the context of reasonable life. If we study almost 700 Koranic verses and hundreds of *hadith* cited in reliable Islamic reference books, we will find that Islam believes that living without a knowledge of the realities of man and the universe is not living at all, and realize how ridiculous it is to question the value of science in Islam. In order to study the influence of these references on Muslims, it is best to refer to the great number of Muslim scientists and scholars throughout history.

Bertrand Russell admits:

"The Muslims had a more experimental approach in their scientific research –particularly in chemistry – than the Greek, They endeavoured to turn cheap metals into gold, discover the secrets of alchemy and reach the elixir of life, because they had a deep respect for chemistry.

During all the years of ignorant and darkness, it was the Muslims who actually advanced civilization, and any knowledge gained by late medieval scholars, like Roger Bacon, was based on Islamic science."[5]

Aldo Mili writes:

"Arabic knowledge, which provided the basis for the new European civilization, lost its worldwide acclaim in the l3th century.

Alfred North Whitehead adds:

"The Byzantine and the Muslims were civilizations themselves, so their cultures retained their innate forces, reinforced by physical and spiritual adventures. They traded with the Far East and widened their territory in the West, made laws, created new forms of art, took an analytical approach to theology, revolutionized mathematics and enriched medicine.[6]

George Sarton believes:

"Perhaps the most significant –but still the least visible –scientific development during the medieval era, was the establishment of empirical thought. The Muslims made possible the progress of this way of thinking up to the 12th century...Even a brief description of how Islam has developed science would exceed the capacity of this book. They did far more than just translating Greek scientific references. They not only passed science on to the next generations, but also provided their own innovations.

Creating a new universal excellent scientific civilization in less than two centuries is quite an achievement, and we cannot praise it enough."[7]

In ***Allah's Sun Shines on the West****,* Sigrid Hunke adds:

"Using their scientific research and experience, the Muslims changed the raw material they got from the Greek into a new face of science. In fact, it was the Muslims who established the role of experience in scientific endeavour... Not only did the Arabs save the Greek civilization from fading away, but also introduced empirical scientific methods in chemistry, natural sciences, arithmetic, algebra, zoology, trigonometry and social sciences. Furthermore, many of their inventions and discoveries in various fields of science were stolen or pertained to others."

Gustav Le Bon, the French researcher believes:

"Up to the 15th century, no quotation was credited unless it had been quoted by the (*Muslim*) *Arabs. George Bacon, Leonardo do Vinci, Arnold, Raymond Loli, Villano, St. Thomas, Great Albert and Alfons the Tenth were either trained in Islamic schools or wrote about them. Renagne, the French philosopher believes that the Great Albert learned all he knew from Avicenna, and St. Thomas' philosophy originates from Ibn Rushd. For* 500 *to* 600 *years books written by Muslims dominated European textbooks."*[8]

Let us return to John Bernal, who has divided great scientific endeavours into three periods:

"There have been three great periods of scientific endeavours: 9th – century Islam, 11th–century Spain and 13th–century France."

Thus, can we still claim that Muslims imitated others' science?

Their empirical method was not incidental; it is derived from Islamic reference books. Imam Ali (a) has frequently emphasized the necessity of science. Here are a few of his *hadith* on this matter:

1– *Experience leads to new science.*[9]
2– *There are two types of wisdom: natural and experience–based. Both are quite advantageous.*[10]
3– *The value of man's ideas depends on his experience.*[11]
4– *Accurate calculation leads to success and it is experience can cause accurate calculation*
5– *Wisdom lies in keeping and using one's experience*[12]

6- *Cruel is the one who deprives himself of the treasure of wisdom and experience he has*[13]

Examples of the Amazing Flourish of Science and Objective Culture in Islam

Pierre Rosseau writes:

"Only three centuries after the demise of the Prophet of Islam, Qartaba with the population of one million, had 80 *public schools – almost equivalent to today's universities –and a library containing* 600, 000 *books in Arabic, which had become the main language of science around the world.*[14]

Let us now take a look at some of the libraries built by Muslims:

1. *The library of the observatory at Maragheh, built by Khwajah Nasiruddin Tousi, containing* 400,000 *books.*

2. *The library of Najaf in the 10th century* (*about the time Sheikh Tousi lived*) *contained* 40, 000 *books*

3. *During the reign of the Baghdad Caliphs, one library had* 100,000 *books.*

4. *Azizi, the Caliph of Cairo, had a library containing* 1,600,000 *books,* 6500 *volumes of which were on mathematics and* 18000 *others on philosophy. His son, as his successor, did a great deal to develop the library, and built 18 study halls near it.*

In addition, governors and visitors throughout history have played a significant role in gathering books and constructing libraries that paved the path toward scientific advance. Mahlabi left after his death a library of 170, 000 *books. His young colleague, Saheb-ibn-Ibad, had collected* 206,000 *books, and one of Saheb's judges had collected over a hundred thousand books. These figures are, nevertheless, approximate. Many librarians were busy working in Cairo, where only two of the libraries had* 2,200,000 *books. In* 891, *there were a hundred libraries in Baghdad"*[15]

1. This appendix has been compiled from Allameh Jafari's Interpretation of the Nahjol-balagheh, Vols. 19 and 22.
2. John Bernal, Science in History.
3. Isaac Asimov, The Encyclopaedia of Science and Industry.
4. John Bernal, Science in History.
5. John Bernal, Science in History.
6. Alfred North Whitehead, The Story of Thoughts.
7. George Sarton, The Story of Science.
8. Gustave Le Bon, The Islamic and Arab Civilization.
9. Hassan ibn Ali ibn Shu'ba, Tohaf-ol-oghoul.
10. Allameh Majlesi, Beharul-Anwar.
11. Abdul-vahed Amedi, Ghorar-ol-hekam va Dorar-ol-kalem.
12. Nahj-ol-balagheh, Letter No.31 (Imam Ali's letter to Imam Hassan)
13. Ibid., Letter No.78.

14. Pierre Rosseau, The History of Science.
15. Sigrid Hunke, Allah's sonne Uber den Abendland (Allah's Sun Shines Upon the West.)

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