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Islam and Science

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A B S T R A C T

Islam is one of the largest religions in the world with followers of more than 1.6 billion (about 23% of world population). In Islam, its followers are encouraged to seek knowledge in many aspects including science. Islam gives perspective to its followers and mankind in general to see how the scientific discoveries should give beneficial impact the society. Science provides focus to solve questions, discover the truth, and conceive inventions. In many cases, Islam provides information and several clues about scientific discoveries and facts in this world. Many of these scientific information was mentioned in the Qur'an, the Islamic Holy Book, since it was revealed about 1,500 years ago. Most of this information had not been proven yet until recently in the 20th and 21st centuries when the scientific methodologies and equipment made it possible to discover the truth of that information. In this study, several scientific information mentioned in the Qur'an will be discussed including the recent scientific discovery of the truth for that information.

Keywords: Islam and Science, Qur'an, Scientific miracle of the qur'an

1. Introduction

The discussion about interconnection between religion and science has long been part of the development of religion itself. Any religion that does not relate the natural and scientific phenomena is not considered as logical or making sense. As one of the largest religion, Islam has been on the focus of discussion about its logic and relevance to scientific discoveries and development to give benefit and blessing to mankind and to the world in general. In the Qur'an Chapter 21 Verse 107, it is clearly mentioned that Islam is the religion of mercy to the world (Corpus Qur'an.com. 2023; Yousuf, A. 2006).

This article aims to provide information regarding the relationship between Islam and Science through literature review and Qur'an and Hadith interpretation. The article also supports the majority opinions that Islam encourages development of science and knowledge in general by providing some examples of scientific and technological development during Islamic golden era under the Islamic rule.

2. Islam and The Obligation of Seeking Knowledge

Islam is one of the second largest religion in the world after Christianity. In 2015 Report of The Future of World Religions, Pew Research Center reported that with the recent trend of Islamic Religion growth, it is predicted that the number of Muslims will nearly equal Christians around the world in 2050 (Pew Research Center, 2015) as presented in Figure 1. This prediction is also based on the estimation of population growth in 2035 presented in Figure 2 (Pew Research, 2017).

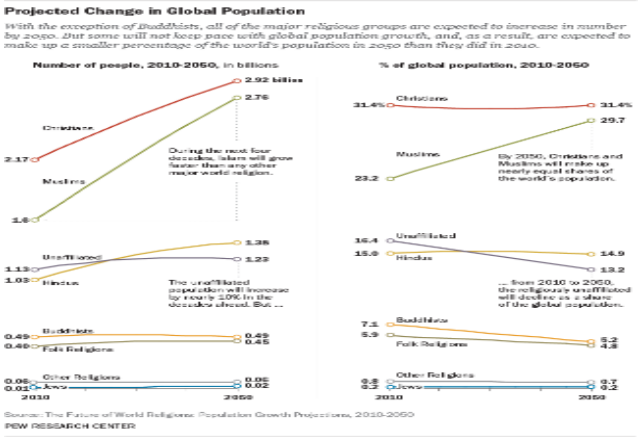

Figure 1. Projected Changes in Global Population (Source: Pew Research Center, 2015).

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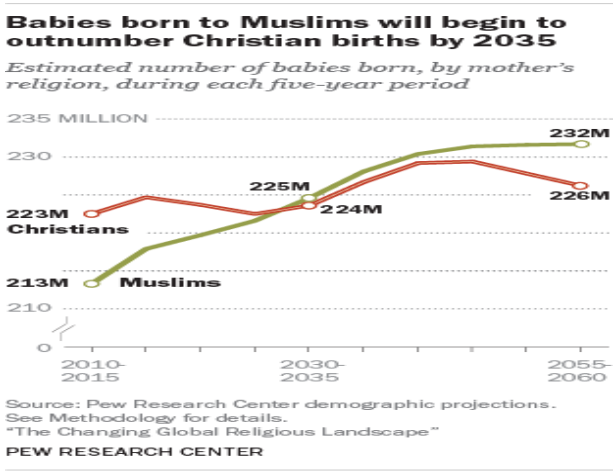


Figure 2. Estimated number of babies born by mother's religion (Source: Pew Research Center, 2015).

As the Church discouraged scientific research and regarded the Scriptures as the only reference to be consulted in all matters, Muslims, on the other hand, had adopted and built upon Greek tradition in scientific works (Yalkincaya, M.A., 2011). Islam encourages its followers to seek knowledge in many aspects of life, including religious and scientific knowledge. This encouragement is mentioned many times in the Holy Book of Islam, the Qur'an, as well as the saying or hadith of Prophet Muhammad. Both Muslim men and women are obligated to learn and seek knowledge that is beneficial for themselves and the community as the Prophet said: "Seeking knowledge is a duty upon every Muslim, and he who imparts knowledge to those who do not deserve it, is like one who puts a necklace of jewels, pearls and gold around the neck of swine" (Sunnah.com, 2023). This encouragement was implemented by many Muslims scholars during the 8th through the 13th centuries, which was known as the Islamic Golden Age (Khan Academy, 2023). During this era Muslim scholars like Al Khwarizmi, Ibnu Sina (Avicenna), and Ibn Al-Haytham who invented Algebra, Medical Science, and Camera, respectively. Basically, Islam had 400 years superiority in science and scientific discoveries over Europe during the Islamic Golden Age (Walbridge, J., 1998). Al Khwarizmi was excellent in Math and Astronomy. He did not only introduce Algebra, Algorithm, and Arithmetic using Arabic number 0 to 9, but also created astronomical table and atlas (Hitti, P.K., 1970). Another great contributor of Medicine was Al Razi. He was the mentor of Al Kindi and Avicenna who had great contributions in understanding smallpox and measles. Ibnu Sina (Avicenna) authored at least forty-three medical works. The most famous one was the *al-Qonun fi al-Tibb* ("the canon in medicine"), which summarized in a million words the Hippocratic and Galenic traditions (Hitti, P.K., 1970).

Unfortunately, this Golden Age has diminished for more than seven centuries now. No wonder the have been very view Muslim scholars involved in science and scientific discoveries compared to scholars from western countries. There have been several theories about the declining scientific discoveries in Islam. According to Cohen, the most relevant reasons were the destruction of the Islamic cultural and scientific resources by Mongolian invasions in 1258, a general failure of science to engage the interests and commitment of Muslim intellectuals, and a failure to reconcile science and Islam (Cohen, F.H., 1994). According to Huff (1993) and Grant (1996), condemnation of science and philosophy by Muslim theologians played a crucial role in failure of reconciliation of science and Islam, and failure of engagement of Muslim intellectuals in science and philosophy.

3. Islamic Science and Islamization of Knowledge

After being marginalized for more than five centuries, Islamic Science and Islamization of Knowledge has started in Pakistan in 1970s. During his presidential times, President Zia implemented a program of Islamization of Society, and particularly of education. In 1979, Abdus Salam, a Pakistani nuclear physicist won Noble Price for his work in weak nuclear force and electromagnetism (Walbridge, J, 1998). Savage-Smith noted that 1980s was seen as unprecedented growth of activity and maturity in the history of Islamic science and medicine (Savage-Smith, E., 1988). In 1983, the Commission on Scientific Signs of the Qur'an and the Sunna was founded. The mission of this organization was described as "showing, verifying and publishing Scientific Signs found in the Quran and Sunna'. It was an endeavor that has also been described as attempting to prove that "the Qur'an prophesied the Big Bang theory, space travel and other contemporary scientific breakthroughs," an example of seeking scientific foreknowledge in sacred texts (Golden, D. 2002). In 1987, International Conference on the Scientific Miracles of the Qur'an and Sunnah was held in Makkah, Saudi Arabia. This conference was co-sponsored by the International Islamic University in Islamabad, Pakistan and the Organization of Scientific Miracles in Makkah, Saudi Arabia. The conference represented the most simplistic attempt to reconcile Islam and modern science. During conferences there were several scientific studies presented and discussed by Muslim scholars, intellectuals, and scientists.

4. From Islamization of Knowledge to American Islam

The Islamization of Knowledge movement was adopted immediately in the United States by establishment of the International Institute of Islamic Thought (IIIT) in Washington, DC. The institute was founded in 1981 by Ismail Raji al Faruqi, Abdul Hamid Abu Sulayman, and Taha Jabir Al Alwani (Bano, M. 2018). The International Institute of Islamic Thought primary aims are intellectual and religious. It dedicates to the revival and reform of Islamic thought and its methodology in order to enable the Ummah to deal effectively with present challenges and contribute to the progress of human civilization in ways that will give it a meaning and a direction derived from divine guidance (Spannaus, M. 2018).

The International Institute of Islamic Thought introduced *Tawhidic Methodology* for the social sciences to close the separation between Islam and modern academics (Spannous, M. 2018). This methodology has been adopted in other academic fields including natural sciences such as biology, physics, chemistry, and astronomy. Because Islamic religion encourages its followers to seek knowledge and being part of social and intellectual community, *tawhidic* methodology is not against modern scientific methodologies. In general, *tawhidic* methodology plays a crucial role in shaping the scientific methodology that holds scientific morality and social justice, especially for Muslim scientists.

5. Scientific Miracles of the Qur'an and Sunnah

The Qur'an contains 114 chapters with 6236 verses (El Khadrawy, A.S.A.I. et. al. 2022). It was revealed from God the Almighty to Prophet Muhammad verses by verses for 23 years period from year 610 to 632. During this period, scientific methodology and equipment were very limited. For example, microscopy was found in 1668 by Antoni van Leeuwenhoek (Hass, L.F. 1992), more than 1,000 years after Qur'an revelation. Scientific studies such as embryology, genetics, and evolution were developed in year 1800s. Modern medical and scientific methodology and equipment, including computers were developed in late 1900s and early 2000, more than 1,300 years after Qur'an revelation. However, many verses in the Qur'an and the sayings of Prophet Muhammad (Hadith) mentioned about process creations which are relevant to sciences such as biology, physics, and chemistry.

5.1. Human Embryonic Development

In the Qur'an, the process of human embryonic development was clearly mentioned steps by steps, even though there was no scanning or viewing equipment available in that time. In the Qur'an, which was revealed in year 600, Chapter 23 verses 13 and 14 it is said: "Then We placed him as a sperm-drop in a firm lodging. Then We made the sperm-drop ("nutfah") into a clinging clot ('alaqah"), and We made the clot into a lump [of flesh] or *mudghah*, and We made [from] the lump, bones, and We covered the bones with flesh (*idzhomah*); then We developed him into another creation. So blessed is Allah, the best of creators." (Corpus Qur'an.com. 2023; Yousuf, A. 2006). This process is very similar to the scientific explanation of human embryonic development based on research and realistic observations (Fig. 3).

The human embryonic development starts with fertilization that forms a zygote. This zygote is similar to sperm drops that fertilize the egg (*nutfah*) (Saadat, S. 2009). The zygote divides and multiplies into a blastocyst that attaches to endometrium. This stage is similar to the stage of *alaqah* that clings in the uterus. The blastocyst continuously divides into embryo then fetus, which is finally born as a baby. This process is very similar with what was described in the Qur'an when the *alaqah* developed into *mudhgah* then *idzhomah*, which last stage of embryo and the early stage of fetus. It was finally becoming the fetus that was very different than the start (zygote or *nutfah*). Nutfah is just a cell then developed into fetus that resemble to human body ("another form or creation") (Husairi, A. 2019). Meanwhile, scientists in year 1600 through 1800 (1000 through 1200 years after Qur'an revelation) were still struggled to picture the process. In Christianity doctrine of preformation that dominated the theory of generation in the 16th to 18th century, asserted divine act of creation for all organisms. The *ovists* believed that tiny human body or the preexisting germ resided in the female egg. Meanwhile, the *spermists* believed that the tiny human body or the preexisting germ resided in the male sperm (Pinto-Correia, C. 1997). This Christianity preformation doctrine has been proven to be incorrect through the modern scientific observation. Homunculus theory (Fig. 4) or the preformation doctrine is labelled as a misconception in heredity (Clark, MA., Choi, J., and Douglas, M. 2020).

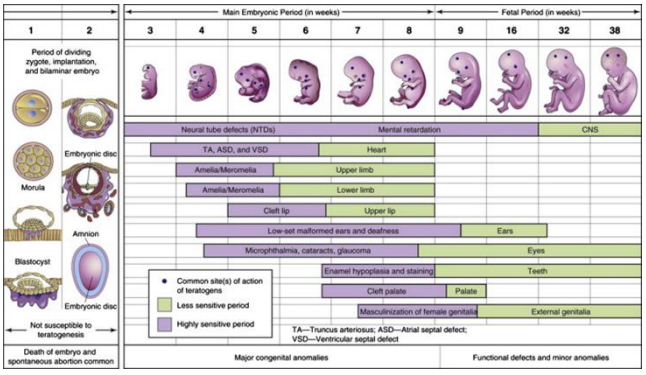
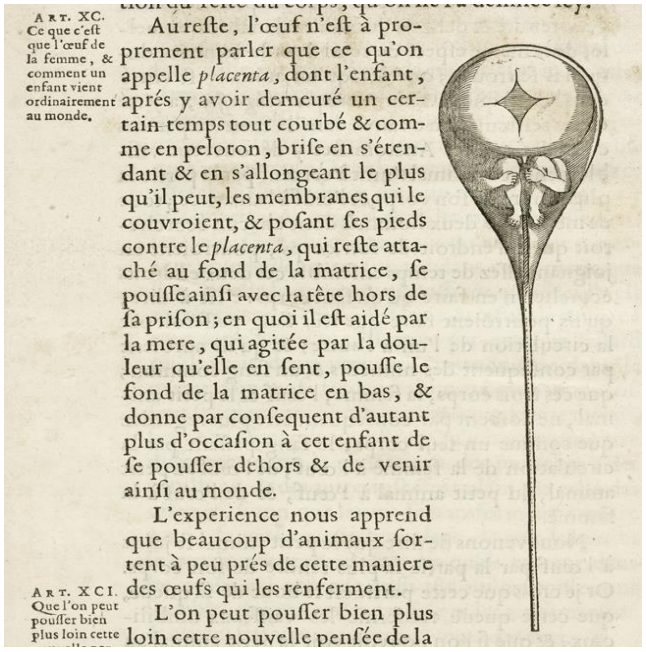


Figure 3. Human embryonic development (Source: Gregory, M.L., Burton, V.J., and Shapiro, B.K. 2015).


ART. XC. Ce que c'eſt que l'œuf de la femme, & comment un enfant vient ordinairement au monde.

Au reſte, l'œuf n'eſt à proprement parler que ce qu'on appelle *placenta*, dont l'enfant, aprés y avoir demeuré un certain temps tout courbé & comme en peloton, briſe en s'étendant & en s'allongeant le plus qu'il peut, les membranes qui le couvroient, & poſant ſes pieds contre le *placenta*, qui reſte attaché au fond de la matrice, ſe pouſſe ainſi avec la tête hors de ſa priſon; en quoi il eſt aidé par la mere, qui agitée par la douleur qu'elle en ſent, pouſſe le fond de la matrice en bas, & donne par conſequent d'autant plus d'occaſion à cet enfant de ſe pouſſer dehors & de venir ainſi au monde.

L'experience nous apprend que beaucoup d'animaux ſortent à peu prés de cette maniere des œufs qui les renferment.

ART. XCI. Que l'on peut pouſſer bien plus loin cette

L'on peut pouſſer bien plus loin cette nouvelle penſée de la

Figure 4. Homunculus from a 1640 Swedish text (Source: Clark, MA., Choi, J., and Douglas, M. 2020).

In the prophetic hadith, it was mentioned that after 120 days, the fetus will have the spirit and considered to be alive (Sunnah.com, 2023). This saying is very relevant with the condition of fetus or baby inside the mother's womb that starts showing the sign of life such as cardiac pulsation within the 16th week pregnancy. Determination of the blowing of the spirit to the fetus can be applied in the law of abortion. Since the spirit has been blown, then the law of abortion after the age without acceptable or emergency reasons is clearly forbidden in Islam (Husairi, A. 2019).

5.2. Human Gender Determination

In the Qur'an chapter 53 verses 45 and 46, it is mentioned about the gender of the baby is determined by sperms. It is said: "And that He creates the two mates - the male and female - From a sperm-drop when it is emitted" (Corpus Qur'an.com. 2023; Yousuf, A. 2006). This statement was revealed about 1,500 years ago before the invention of modern equipment such as microscopes to see small objects like the sperms. The modern science, especially Genetics and Heredity show that sperms carry *X* or *Y* chromosome that will determine the gender of the baby when it fertilizes the egg that only carry *X* chromosome. If the sperm that carries *X* chromosome fertilizes the egg, the baby's gender will be female (46, *XX*), but the sperm that carries y chromosome fertilizes the egg, the baby's gender will be male (46, *XY*) (Clark, MA., Choi, J., and Douglas, M. 2020). Human gender can be identified by karyotyping the chromosome taken from the microscopic images of the chromosomes of the human cells (Clark, MA., Choi, J., and Douglas, M. 2020).

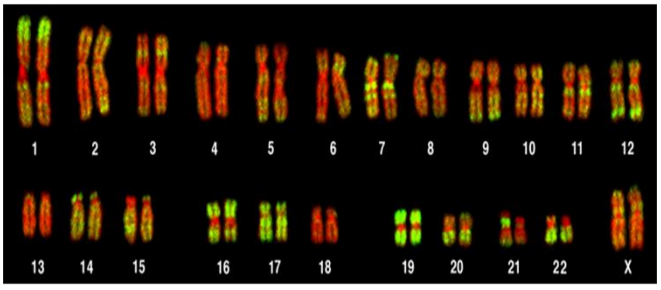


Figure 5. This karyotype is of a female human. Notice that homologous chromosomes are the same size and have the same centromere positions and banding patterns. A human male would have an *XY* chromosome pair instead of the *XX* pair shown. (Source: Clark, MA., Choi, J., and Douglas, M. 2020).

5.3. Human Brain Function

In the Qur'an chapter 96 verses 15 and 16, it is mentioned about the function of human's frontal cortex, the forelock. It is said: "No! If he does not desist, We will surely drag him by the forelock - A lying, sinning forelock." (Corpus Qur'an.com. 2023; Yousuf, A. 2006). This verse can be translated as that the forelock is the area of the brain that is used for controlling actions, both good and bad actions. This statement was revealed about 1,500 years ago long before the modern science found out that the frontal cortex is the part of cerebrum that control actions while the other three parts such as parietal, temporal, and occipital cortexes are mostly for controlling sensations (Welsh, C.J. and Craver, C.P. 2022).

5.4. Human Fingerprint

In the Qur'an chapter 75 verse 4, it is mentioned about the human fingerprint. It is said: "Yes. [We are] Able [even] to proportion his fingertips" (Corpus Qur'an.com. 2023; Yousuf, A. 2006). This verse can be translated as that every human has different fingertips or fingerprints. These unique fingerprints will be put together as proportion of each person in the hereafter during the resurrection day. This statement was revealed about 1,500 years ago long before the crime investigation developed the use of fingerprints as a tool for identification of people.

Fingerprints were not known in ancient times. It was developed in the 19th and 20th century for legal, forensic, and other needs. Nowadays fingerprints are widely used for many applications such as smartphones, computers, and other electronic devices. The modern technology also has developed DNA fingerprinting that opened the door for biological tracing for solving crimes, inheritance disputes, and determining characteristics of a person (Godesa, P. 2023).

Figure 6. Several types of fingerprints. (Source: Sofyan, A. 2011).

5.5. The Origin of The Universe

In the Qur'an chapter 21 verses 30, it is mentioned about the origin of universe and life. It is said: "Have those who disbelieved not considered that the heavens and the earth

were a joined entity, and We separated them and made from water every living thing? Then will they not believe?" (Corpus Qur'an.com. 2023; Yousuf, A. 2006). This verse can be translated as that the universe was created from separation one entity or big mass as John C. Mather and George F. Smoot theorized in their "Big Bang" theory. They received a noble prize for Physics for this theory in 2006 (NASA. 2023). The statement that mentioned about creation of universe from a big entity was revealed about 1,500 years ago in the Qur'an long before the development of modern science.

5.6. The Function of Mountain

The Qur'an chapter 78 verse 7 mentions about the function of mountain on earth. It is said: "And the mountains as pegs?" (Corpus Qur'an.com. 2023; Yousuf, A. 2006). This verse clearly mentions the function of mountains as pegs to stabilize the earth. This verse was revealed about 1,500 years ago. And just recently new technology found out that mountains have underlying roots that are deeply embedded in the ground causing the mountain to look like a peg (Press, F. and Siver, R. 1982).

5.7. Other Scientific Subjects

There are many more verses mention about science in the Qur'an. Much of this scientific information has been proven to be correct by modern scientific findings and research. For examples, the water cycle and formation of rain (Qur'an chapter 30 verse 48), barrier between two seas (Qur'an chapter 25 verse 53; and chapter 55 verses 19 and 20), light zones in the ocean (Qur'an chapter 24 verse 40), and many more clues that have been observed and yet to be observed as it is said in the Qur'an chapter 3 verse 190: "Indeed, in the creation of the heavens and the earth and the alternation of the night and the day are signs for those of understanding" (Corpus Qur'an.com. 2023; Yousuf, A. 2006).

6. Conclusion and Way Forward

Islam is the religion that support all beneficial knowledge including science. Islam does not have any contradiction with scientific knowledge. It does not only relevance to science but also encourages people to learn science by giving much information and clues regarding science and scientific inquires. Some of the information given in the Islamic book or Qur'an were not even present in the time the revelation. The information mentioned in the Qur'an are very detail, specific, and proven to be logical and correct. For example, Qur'an contains comprehensive description of human development; no such distinct and complete record of human development, such as classification, terminology and description existed before. This knowledge came to us in an era when there were no microscopes, no slides, no fixatives, or any other gadgets. A quote from the Qur'an chapter 41 verse 45: "Soon we will show them our signs in the (furthest) regions (of the earth), and in their own selves, until it becomes manifest to them that this is the truth. Is it not enough that your Lord does witness all things?" (Corpus Qur'an.com. 2023; Yousuf, A. 2006).

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