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SCHOOL OF ARTS AND SOCIAL SCIENCES

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COURSE TEAM: **A. F. Ahmed PhD**
School of Arts and Social Sciences
National Open University of Nigeria

COURSE EDITOR: **(Un-Edited**)

National Open University of Nigeria
Headquarters
14/16, Ahmadu Bello Way,
Victoria Island,
Lagos.

Abuja Annex
245, Samuel Adesujo Ademulegun Street,
Central Business District,
Opposite Arewa Suites,
Abuja.

e-mail: centralinfo@nou.edu.ng
URL: www.nou.edu.ng

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MODULE 1: PRELIMINARIES

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UNIT 1: DEFINITION OF TERMS – Islam and Science

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1.0 INTRODUCTION

Since acquisition of knowledge is the key to successful living, one of the early *Surahs* of the Holy *Qur'ān* speaks of reading which is the primary source of knowledge. Islam considers knowledge as a comprehensive whole, which covers both spiritual and material aspects of human life. Indeed, what distinguishes the Muslim scholars from the Christian priests, according to Oloyede, is the unique place of knowledge. Knowledge to the former is what leads to discovery in any field. Muslims are therefore required to seek knowledge in all fields, and from even the most distant places. In Hadith, the Holy prophet says:

"Seek for knowledge even if it is China". This is why there are a good number of famous Muslim scientists, artists and scholars who contribute a great deal to scientific knowledge.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

· Define the words science and Islam.

· Highlight the rapport between Islam and science.

· Identify and assess the unique contributions of the early Muslim scholars to science.

3.0 MAIN CONTENT

3.1 Definition of the Word Islam and Science

It is considered not worthwhile to attempt any definition for Islam again here as we had extensively dealt with it earlier. However, we shall try to delve into the other word i.e. science. The word 'Science' which is known as 'I*lm* in Arabic is from the Latin word '*Scientia*' which connotes 'knowledge' or "to know". It implies that, science generally, conveys knowledge as a whole but later it specifically refers to "knowledge of nature." It involves a pursuit of knowledge covering general truths or the operation of fundamental laws. It has been defined as "any branch of study related to observation and classification of facts" (Gove; 1981) Sarton George (1985) in the Encyclopaedia Americana defines science as "positive knowledge" The *Encyclopaedia Britannica* (1988) calls it "any intellectual activity concerned with the physical world and "entailing unbiased observations and systematic experimentation". (p.552). The Encyclopaedia of science cited by Akintola (1992) defines it as "an organised body of knowledge and opinion which is systematically supported by formal proofs or by observational evidence …". It could be inferred from the above, therefore, that science is a body of knowledge obtained or acquired through systematic observation and experiment which allows us to deduce laws and principles. Thus, Kennedy would regard any knowledge acquired by means of scientific method as science. (Kennedy, 1959:12)

3.2 The Relationship between Islam and Science

There is no relationship existing between the two terms save what the *Qur'ān* says about them. The former, being a divine religion emphasizes the latter (knowledge).Several verses abound in the *Qur'ān* which make allusion to learning or knowledge. Indeed, the first *Qur'ān*ic verse revealed to Prophet Muhammad (saw) which charges him to "read"shows a good rapport between the two terms. Other *Qur'ān*ic verses include: "…Are those who know equal to those who know not ?" (Q39:10). "…And none knows its right interpretation except Allah and those who are firmly grounded in knowledge (Q3:7)" Further evidence of the passion of Islam for science (knowledge) could be inferred from the words of the prophet at the close of battle of Badr in 622 CE/1O AH when he declares: …… after the battle of Badr and Muslim victory, to the huge crowds whom they had taken prisoner, that any polytheist who trained ten Muslims to read and write should win

freedom. (Sayd Mujtaba 1977:73). The prophet (saw) pronouncement was put into practice, and it was thus that a large number of his original adherents were put on the track of education. *Imam* cAli (*R.T.A.*) the third rightly guided caliph, declared that the spreading of science and knowledge and culture and intellectual ability was one of the merits to be covered and achieved by every Muslimgovernment. In the record of his words it is reported that he said: O people! I have rights over you and you have rights over me. Your right over me is to insist that I shall always give you guidance and counsel, and seek your welfare, and improve the public funds and all your livelihoods, and help raise you from ignorance and illiteracy to heights of knowledge, learning, culture, social manners and good conduct. (Sayyid Mujtaba, 1977:73).

The Abbasid Caliph Macmum founded a "House of Wisdom" Bayt al – Hikinah in Baghdad to be a centre of science. He was a great scholar and a lover of scholarship. He gave liberal patronage to men of learning and encouraged scholarly discussions in his court. Thus, his court became the resort of philosophers, astronomers, physicians, scientists, poets, and other men of letters. He created an academy which he called bayt al-

hikmah in which there were various departments of learning. Many Greek and ancient works were translated here into Arabic for the accessibility of the common man. Their efforts were not confined only to the reproduction of Greek and ancient works, but in some directions, they extended also to original research. There were adequate provisions for scholars and students to remain in this academy for study and students came from various parts of the world to this academy. Specifically, if the definition mentioned above "any intellectual activity concerned with the physical world and "entailing unbiased observations and systematic experimentation" is anything to go by, then it means thatIslam without question approves any knowledge, investigation, experiments and or intellectual efforts that would either be beneficial to humankind or enhances his better lot. The Glorious *Qur'ān* tasks man in this regard: "O company of *Jinn* and men! If you have power to go beyond the confines of the heavens and the earth, then do so. But you cannot go save with authority" (Q55:33) Thus, Islam through its Scripture, leaves nothing undiscussed as Abubakre (2003:30) rightlyobserves: "The *Qur'ān* is not a book of general knowledge but it is onethat can be considered as a mine of information on nearly every aspectof life". In other words, it deals with all subject matters, scienceinclusive. Browsing through the *Qur'ān*, therefore, would unveildiscussions on scientific thoughts and subjects. Perhaps quotingAbubakre again might bring our position more clearer. Hence there are discussions on biologicalsciences such as those relating to modern biology, botany, zoology, chemistry, physics, dealing with electricity, heat light, scales, and measurements, sound, and weight. Other issues raised in the Holy Book include agricultural sciences to consist farming, horticulture, and irrigation. Among other considerations in the realm of science in the Holy Book is health science which include physiology, psychiatrypsycho- analysis, dietry regulations and medicine (oral and non-oral). The Holy Book also calls for general reflections on other branches of natural science concerning the sky, water cycle and seas, the earths atmosphere and its relief, geology and mineralogy and of course geography and anthropology.(p.30) Akintola (1992) in his *Scientific Discoveries Through Islam* further provides us with what he calls "scientific facts in the *Qur'ān*". These facts include: oceanography, layers of darkness in

the *Qur'ān*, the estuarine system in the *Qur'ān*,, embryology in the *Qur'ān*, the gaseous mass, the two theories of science on end of the world i.e. bubble and heat death to mention only a few.

The points in the above *Qur'ān*ic facts, to our mind, is that all what the modern scientists arrogate to themselves as new inventions have been overtly or covertly mentioned some one thousand four hundred andtwenty-eight years before the advent of the so called scientists nor theirso called discoveries and inventions. Perhaps, these "scientific facts inm the *Qur'ān*" spurs Oloyede (1987) in a paper titled "Secularism and Religion: Conflict and Compromise (An Islamic Perspectice) to posit: It was only in 1961 that astronauts discovered the possibility of the conquest, of space which the *Qur'ān* has alluded to over one thousand four hundred years ago. The *Qur'ān* also predicted the possibility, with God's command of exploration of the earth and it came to pass. The Holy *Qur'ān* in chapter 50 verses 9-11 has also treated water cycle in a manner that science later came to agree with. The nature of attitude in space was also indicated in the *Qur'ān* in chapter 6, verse 123. It states that "The Sun and the Moon follow courses prescribed by special accounting". (p.28-9)

3.3 Early Muslims and Their Contributions to Science

Al-Harith b. Kaladah of Ta'if (d.634CE/ 14AH) otherwise known as 'Doctor of the Arabs' has been regarded as the pioneer of Arabknowledge of science, for he was said to be the first scientifically trained man in the Arabian peninsular. Robert Briffault earlier quoted opines that it was the Arabs and early Muslim scientists who injected the spirit of inquiry into Europeans. In his words, "…New method of investigation, of experiment, of observation, of measurement, of the development of mathematics in a form unknown to the Greeks" (p.190). Abu cUbaydah, a Muslim geographer who lived in the 10th century was among the early Muslim geographers who popularized the Indian belief that the world had four cardinal points of equi-distance from each other called *Arin* theory. Muslim scholars invented the numerical systems and algebra. Muhammad b. Musa, in the realm of Physics invented pendulum while the Muslim mathematicians such as al-Khwarzimi, Muhammad

b.Zakariya' e.t.c. did not only pioneer the theory of alegorism but also were the first to use decimal notion. During the reign of Ma'mun of 'Abbasid period, Abu yusuf Ya'qub al-Kindi otherwise known as the "Philosopher of the Arabs" and one of the greatest minds in world history according to Cardano began his literary acumen, which was not only to transmit to his countrymen a knowledge of Aristotelian and Neo-Platonic philosophy in translation and adaptation, but also to extend their intellectual horizon by studies in natural history and meteorology made in spirit of that philosophy. Al- Kindi according to *History of the Islamic Peoples* showed himself a child of his time in his cultivation of astrology, and even the study of the future from shoulder bones , as entirely serious sciences. Some chemicals, according to Akintola elsewhere (1990) were discovered by Muslim scholars. These chemicals include: sulphuri acid, nitric acid, potassium, ammonia salt, alcohol,preparation of mercury e.t.c. Ibn Zuhr (Avenzoar 1091-1192) of Andalusia (cordova) introduced surgery as well as pharmacology in the 12th century. Abu cAli Husayn ibn Zina otherwise known as Avicenna among the Latin scholar as was regarded as the Great Physician. Indeed, his *Magnum Opus* (Canon) served as a veritable material for several centuries world over,especially in the European Universities. Perhaps, this outstanding achievements of the scholar accounts for why his portrait along with Ar- Razi adorn the great hall of the school of Medicine in Paris. Abu Bakr Muhammad Ar-Razi made his indelible print in the field of medicine. The Muslims also developed original concepts in physics and chemistry. For instance, al-Hazim had a pioneering work on optics. In sum, therefore, Akintola's *Scientific Discoveries Through Islam* is repelete with about twenty-one scientific discoveries invented by the early Muslim scientists (p.14) while Abubakre provides us with various Arabic terms still in use in the modern and contemporary science. These terms range from astronomy, botany, chemistry, Medicine and mathematics. (p.33-4).

SELF-ASSESSMENT EXERCISES

i. What is the relationship between Islam and Science?

ii. Write a concise essay on the early Muslims and their contributions to the modern science

4.0 CONCLUSION

The foregoing also has re-emphasized the timeless relevance of the Muslim Great Book, *alQur'ān* because all the indexes pointing to science in the Scripture do not only remain unchallengeable but also incontrovertible. Indeed, the challenge thrown by the *Qur'ān* as well as its encouragement of scientific experiment and/ or researches had led to scientific advancement in the modern world.

5.0 SUMMARY

It has become obvious from the foregoing discussion that modern day scientists would for ever be indebted to the early Muslim scientists, for the latter have been the great mentors of learning and sciences.

6.0 TUTOR MARKED ASSIGNMENTS

1. Assess the contributions of Ibn Sina and Fakhru'd-Din Ar-Razi to the modern and contemporary science.
2. To what extent would you agree that Islam and science are inseparable?

7.0 REFERENCES/FURTHER READINGS

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UNIT 2: THE FIRST REVELATION: ITS EDUCATIONAL AND SCIENTIFIC SIGNIFICANCE

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1.0 Introduction

2.0 Objectives

3.0 Main Contents

3.1 Definition of Term

3.2 First Revelation in the holy *Qur'ān*

3.3 Significance of the First Revelation to Islam

4.0 Conclusion

5.0 Summary

6.0 Tutor – Marked Assignment

7.0 References / Further Readings

1.0 INTRODUCTION

One of the unique characteristics of the *Qur'ān* is that its arranagement is divine, i.e. through guidance sent by Allah and brought by Angel Jibril to Prophet Muhammad. This unit will focus on the exegesis of chapter ninety-sixth whose first five verses were the first revealed passages of the Glorious *Qur'ān*. In the Unit you will learn something about the first five verses, the importance Islam attaches to knowledge right from its inception, and some moral and social issues that can be derived from the*Sūrah*. Furthermore, an exegesis of *Sūrah al-Qadr* which alludes to the moment in which the encounter between the Prophet Muhammad and Angel Jibril occurred will also be taken together with *Sūrah al-'Alaq.*

2.0 OBJECTIVES

At the end of this unit you should be able to:

- State the meaning of the first five verses of *Sūrah a`l-Alaq.*
- Comment on the themes of the five verses

- Highlight the message of the Surah and how it relates to knowledge and sciences.

3.0 MAIN CONTENT

3.1 Text, Translation and Commentary of the first five verses of the Sūrah

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ {1} خَلَقَ الْإِنسَانَ مِنْ عَلَقٍ {2} اقْرَأْ وَرَبُّكَ الْأَكْرَمُ {3}

الَّذِي عَلَّمَ بِالْقَلَمِ {4} عَلَّمَ الْإِنسَانَ مَا لَمْ يَعْلَمْ {5}

In the Name of Allah the most gracious, the most merciful.

(1) Read in the name of your Lord who created,

(2) Created man from clots of blood.

(3) Read: your Lord is the most Bounteous,

(4) Who has taught the use of the pen,

(5) Has taught man what he did not know.

Self Assessment Exercise

- Attempt recitation and writing the first five verses of Surah Alaq.
- Attempt translation of the Surah in idiomatic English

3.2 Commentary on the themes of the five verses:

To start this commentary we hereby remind you this short account of the prophet's experience as a background. When the Prophet was close to age forty, he began to frequent cave of Hirā' in the outskirt of the city of Mecca for seclusion. He would stay there for some days in meditation and reflecting over the happenings in his society and the creation in general; and would then return to his family.

On one of such occasions, Angel Jibril appeared to him, got hold of him, squeezed him, and said: "*Iqra*", which means "read!". The Prophet replied! "I cannot read". The Angel held and squeezed him again. On the third time, the Prophet read along with him. Thereafter the Angel disappeared.

Thus, the word *'Iqra'* is the first in the entire words of the *Qur'ān*. It appears twice in this section and never appears again in any other portion of the sacred Book. The Prophet is so addressed here as if he is standing in the presence of Allah being directed on the first thing he must do to deliver the message of his Lord. The essence and significance of this word again becomes lucid by the time one realizes that the Prophet who is asked to read is unlettered. This, without any doubt teaches that the reading is beyond mere reading of letters written on pages of book. It has to do with proper education and enlightenment. It also shows that Islam attaches importance to knowledge and education from its on-set.

The methodology of this knowledge is stated as 'in the name of your Lord'. The implication of this is that, the concern for Allah should guide our steps in all learning situation. It is only then the pursuit can have value and benefit humanity.

In the remaining portions, Allah describes Himself to man so that he will appreciate why he must read in His name. The first is that it is this Lord who creates all things but He is not created. This means that He is the originator of all things and then singles out man whom He creates from the clot which sticks to the womb. One may even deduce the fact that this first revelation also touches on embryology. However, the divine passage is also to let man reflect over the grace of Allah in elevating him to the status of being a man that can now learn.

The second directive asking him to read also describes his Lord as being Generous. It is out of His bounties that He has favoured man with His glorious Book and the ability to read. Also, He has taught the use of pen among men. For without His favour, the pen cannot write anything perceptible to man. Just as people communicate using their tongues; Allah has also made it possible through the use of pen. Only Allah can tell how many letters or books men have written to share their views and feelings.

The emphasis in the fifth verse is that whatever knowledge man acquires is a favour Allah has bestowed on him. Thus, when man attains any level in knowledge he should see it as a divine favour.

Semantically, the Arabic words for 'teach' and 'knowledge, appear to be from the same root. Thus makes as much impossible to find harmony in a single word, for 'read', 'teach', 'pen' (which implies reading, writing, books, study, research and reportage. The proclaiming or reading symbolically goes beyond the Prophetic office to exclude related duties. Such duties are as promulgation and dissemination of the truth by all those who understand it. The comprehensive meaning of 'qara'a, refers not only to particular person and occasion but it also gives a universal direction. This is what Islam stands for i.e. the pursuance of positive knowledge.

Islam has always thrived on knowledge of worth. Knowledge and abilities come from Allah. Islam employs the wisdom underlying strength, beauty, wealth, position, power, knowledge or talents. This culminates in Science, Art, Government or Organisation among many benefiting undertakings necessary for human development. This moves beyond the barrier of origin; North, South, West and East, all to the betterment of a Muslim. It is to this end that early seventh century translation of Greek Philosophers' work serve as water-shed for Arab earlier civilization.[2]

Self Assessment Exercise

The first Revelation of the *Qur'ān* is vital as call for renew order in Islam in the area of science. Discuss.

4.0 CONCLUSION

Thus we conclude that Islam began and thrived on knowledge seeking, acquisition and utilization for the betterment of human race. Its acquisition is boundless. It concludes that where the source of knowledge comes from, it is absorbable in as much as it is not too hostile to the Qur'ān and Sunnah.

5.0 SUMMARY

This unit had show-cased the first to be revealed in the Qur'ān and how important it is to the renewed order of Islam. Excursion was also made into how the mission

started. We concluded, however with triumph of Islam over human machination and how the theme in the first revelation influenced the wares of knowledge as instrumental to human civilization.

6.0 TUTOR – MARKED ASSIGNMENT

i) Discuss the concept of Revelation and Islam

ii) The first revelation of the *Qur'ān* marked the beginning of new era in Arabia. Discuss.

iii) Highlight the essential benefits of the first revelation of the *Qur'ān*.

7.0 REFERENCES AND FURTHER READING.

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6. Muhammad Iqbal, *Reconstruction of Religious Thought in Islam*, Muhammad Ashraf, Lahore, 1968.

UNIT 3 : THE QUR'ĀN ON CREATION OF THE UNIVERSE

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Contents

- 3.1 The Quran on the Origin of the Universe
- 3.2 Analysis of the Quranic science related guides.

4.0 Conclusion

5.0 Summary

6.0 Tutor – Marked Assignment

7.0 References / Further Readings

1.0 INTRODUCTION

This Unit focuses on some other Quranic statements bearing scientific hints on the creation of the Universe

2.0 OBJECTIVES

At the end of this Unit you should be able to

Relate Qur'ānic statements having scientific contents relating to the origin of the Universe.

3.0 MAIN CONTENTS

3.1 The Qur'ān on the Origin of the Universe.

The science of modern cosmology, observational and theoretical, clearly indicates that, at one point in time, the whole universe was nothing but a cloud of 'smoke' (i.e. an opaque highly dense and hot gaseous composition). This is one of the undisputed principles of standard modern cosmology. Scientists now can observe new stars forming out of the remnants of that 'smoke' (see figures 10 and 11).The illuminating stars we see at night were, just as was the whole universe, in that 'smoke' material.

God has said in the Q. 41:11

﴿ Then He turned to the heaven when it was smoke... ﴾

Because the earth and the heavens above (the sun, the m oon, stars, planets, galaxies, etc.) have been formed from this same 'smoke,' we conclude that the earth and the heavens were one connected entity. Then out of this homogeneous 'smoke,' they formed and separated from each other. God has said in the Q. 21: 30

﴿Have not those who disbelieved known that the heavens and the earth were one connected entity, then We separated them?... ﴾

Dr. Alfred Kroner is one of the world's renowned geologists. He is Professor of Geology and the Chairman of the Department of Geology at the Institute of Geosciences, Johannes Gutenberg University, Mainz, Germany. He said: "Thinking where Muhammad came from . . . I think it is almost impossible that he could have known about things like the common origin of the universe, because scientists have only found out within the last few years, with very complicated and advanced technological methods, that this is the case. Also he said: "Somebody who did not know something about nuclear physics fourteen hundred years ago could not, I think, be in a position to find out from his own mind, for instance, that the earth and the heavens had the same origin."

Figure 10: A new star forming out of a cloud of gas and dust (nebula), which is one of the remnants of the 'smoke' that was the origin of the whole universe. (*The Space Atlas*, Heather and Henbest, p. 50.)

Figure 11: The Lagoon nebula is a cloud of gas and dust, about 60 light years in diameter. It is excited by the ultraviolet radiation of the hot stars that have recently formed within its bulk. (*Horizons, Exploring the Universe*, Seeds, plate 9, from Association of Universities for Research in Astronomy, Inc.)

Self Assessment Exercise

Discuss the Quranic hints on the origin of the Universe.

3.2 ANALYSIS OF THE DATA IN THE QURAN CONCERNING THE CREATION

We shall examine the five main points on which the Quran gives information about the Creation.

1. The six periods of the Creation of the Heavens and the Earth covered, according to the Quran, the formation of the celestial bodies and the Earth, and the development of the latter until (with its 'sustenance') it became inhabitable by man. In the case of the Earth, the events described in the Quran happened over four periods. One could perhaps see in them the four geological periods described by modern science, with man's appearance, as we already know, taking place in the quaternary era. This is purely a hypothesis since nobody has an answer to this question.
   It must be noted however, that the formation of the heavenly bodies and the Earth, as explained in verses 9 to 12, sura 41 (see page 136) required two phases. If we take the Sun and its subproduct the Earth as an example (the only one accessible to us), science informs us that their formation occurred by a process of condensation of the primary nebula and then their separation. This is exactly what the Quran expresses very clearly when it refers to the processes that produced a fusion and subsequent separation starting from a celestial 'smoke'. Hence there is complete correspondence between the facts of the Quran and the facts of science.
2. Science showed the interlocking of the two stages in the formation of a star (like the Sun) and its satellite (like the Earth). This interconnection is surely very evident in the text of the Quran examined.
3. The existence at an early stage of the Universe of the 'smoke' referred to in the Quran, meaning the predominantly gaseous state of the material that composes it, obviously corresponds to the concept of the primary nebula put forward by modern science.
4. The plurality of the heavens, expressed in the Quran by the number 7, whose meaning we have discussed, is confirmed by modern science due to the observations experts in astrophysics have made on galactic systems and their very large number. On the other hand the plurality of earths that are similar to ours (from certain points of view at least) is an idea that arises in the text of the Quran but has not yet been demonstrated to be true by science; all the same, specialists consider this to be quite feasible.

5. The existence of an intermediate creation between 'the Heavens' and 'the Earth' expressed in the Quran may be compared to the discovery of those bridges of material present outside organized astronomic systems.

Although not all the questions raised by the descriptions in the Quran have been completely confirmed by scientific data, there is in any case absolutely no opposition between the data in the Quran on the Creation and modern knowledge on the formation of the Universe. The existence of such an enormous difference between the Biblical description and the data in the Quran concerning the Creation is worth underlining once again on account of the accusations leveled against Muhammad since the beginnings of Islam to the effect that he copied the Biblical descriptions. As far as the Creation is concerned, this accusation is totally unfounded. *How could a man living fourteen hundred years ago have made corrections to the existing description to such an extent that he eliminated scientifically inaccurate material and, on his own initiative, made statements that science has been able to verify only in the present day? The description of the Creation given in the Quran is quite different from the one in the Bible.*

4.0 CONCLUSION

Q.41:11state that the earth and the heavens were one before their separation. It appears the scientific theory of big bang later confirm this. Q. 21:30 hints on the gaseous nature of the Universe, Q.24:40 mentions the darkness found in deep seas,

5.0 SUMMARY

In this Unit you are taken across several *Qur'ān*ic verses on the creation of the Universe and some natural phenomena such as its gaseous nature. Analysis of the postulations and the divine verses constitutes the second section of the Unit. The Unit also contains views of eminent scientists confirming the authenticity of the Qur'ānic theories.

6.0 TUTOR – MARKED ASSIGNMENT

1. Provide and analyze some Quranic statements relating to the origin of the Universe. Universe.

7.0 REFERENCE/FURTHER READINGS

1. Ibrahim I.A. (1997). *A Brief Illustrated Guide to Understanding Islam*, Darussalam, Houston, Texas, U.S.A.

2. Maurice Bucaille (1976), *The Bible, the Quran and Science,* Seglers, Paris.

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UNIT 4: MOUNTAINS, SEAS, RIVERS AND INTERNAL WAVES.

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1.0 Introduction

2.0 Objectives

3.0 Main Contents

3.1 The Quran on Mountains

3.2 The Quran on Deep seas, Rivers and internal Waves.

4.0 Conclusion

5.0 Summary

6.0 Tutor – Marked Assignment

7. References / Further Readings

1.0 INTRODUCTION

This Unit focuses on some other Quranic statements bearing scientific significance with particular reference to the natural phenomena such as the mountains the deep seas, rivers etc., etc.

2.0 OBJECTIVES

At the end of this Unit you should be able to

Discuss the scientific significance of Quranic statements on Mountains

Provide and analyze the Qur'ānic hints on Deep Seas, Rivers and Internal Waves.

3.0 MAIN CONTENTS

3.1 The Quran on Mountains:

This is how the Qur'ān has described mountains in Sūrah 78:6-7:

Have We not made the earth as a bed, and the mountains as pegs.

Modern earth sciences have proven that mountains have deep roots under the

surface of the ground (see figure 9) and that these roots can reach several times their elevations above the surface of the ground. So the most suitable word to describe mountains on the basis of this information is the word 'peg,' since most of a properly set peg is hidden under the surface of the ground. The history of science tells us that the theory of mountains having deep roots was introduced only in the latter half of the nineteenth century.

Mountains also play an important role in stabilizing the crust of the earth. They hinder the shaking of the earth. God has said in the Q. 16:15:

﴿ And He has set firm mountains in the earth so that it would not shake with you... ﴾

Likewise, the modern theory of plate tectonics holds that mountains work as stabilizers for the earth. This knowledge about the role of mountains as stabilizers for the earth has just begun to be understood in the framework of plate tectonics since the late 1960's.

Could anyone during the time of the Prophet Muhammad ﷺ have known of the true shape of mountains? Could anyone imagine that the solid massive mountain which he sees before him actually extends deep into the earth and has a root, as scientists assert? A large number of books of geology, when discussing mountains, only describe that part which is above the surface of the earth. This is because these books were not written by specialists in geology. However, modern geology has confirmed the truth of the Quranic verses.

Self – Assessment Exercise

Examine the scientific significance of Quranic statements on Mountains.

3.3 The Qur'ān on Seas and Rivers

Modern Science has discovered that in the places where two different seas meet, there is a barrier between them. This barrier divides the two seas so that each sea has its own temperature, salinity, and density. For example, Mediterranean sea water is warm, saline, and less dense, compared to Atlantic ocean water. When Mediterranean sea water enters the Atlantic over the Gibraltar sill, it moves several hundred kilometers into the Atlantic at a depth of about 1000 meters with its own warm, saline, and less dense characteristics. The Mediterranean water stabilizes at this depth (see figure 13).

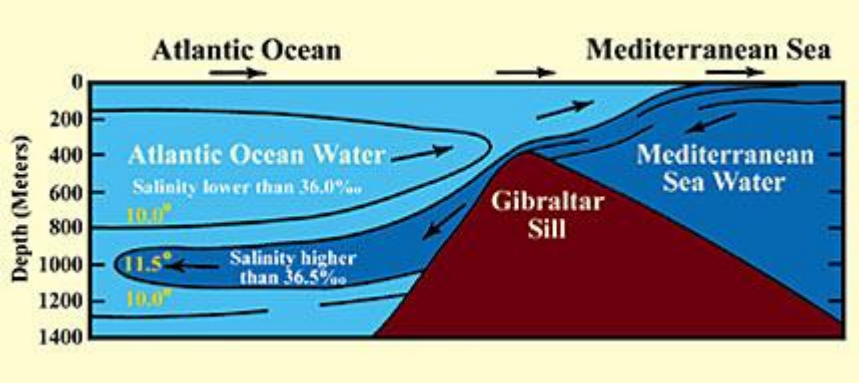


Figure 13: The Mediterranean sea water as it enters the Atlantic over the Gibraltar sill with its own warm, saline, and less dense characteristics, because of the barrier that distinguishes between them. Temperatures are in degrees Celsius (C°). (*Marine Geology*, Kuenen, p. 43, with a slight enhancement.)

Although there are large waves, strong currents, and tides in these seas, they do not mix or transgress this barrier.

The Holy Qur'ān, *Sūrah* 55: 19-20 mention that there is a barrier between two seas that meet and that they do not transgress.

﴿ He has set free the two seas meeting together. There is a barrier between them. They do not transgress. ﴾

But when the Qur'ān speaks about the divider between fresh and salt water, it mentions the existence of "a forbidding partition" with the barrier.

﴿ He is the one who has set free the two kinds of water, one sweet and palatable, and the other salty and bitter. And He has made between them a barrier and a forbidding partition. ﴾ (Q. 25:53)

One may ask, why has the Qur'ān mentioned the partition when speaking about the divider between fresh and salt water, but did not mention it when speaking about the divider between the two seas?

Modern science has discovered that in estuaries, where fresh (sweet) and salt water meet, the situation is somewhat different from what is found in places where two seas meet. It has been discovered that what distinguishes fresh water from salt water in estuaries is a "pycnocline zone with a marked density discontinuity separating the two layers."[3] This partition (zone of separation) has a different salinity from the fresh water and from the salt water (see figure 14).

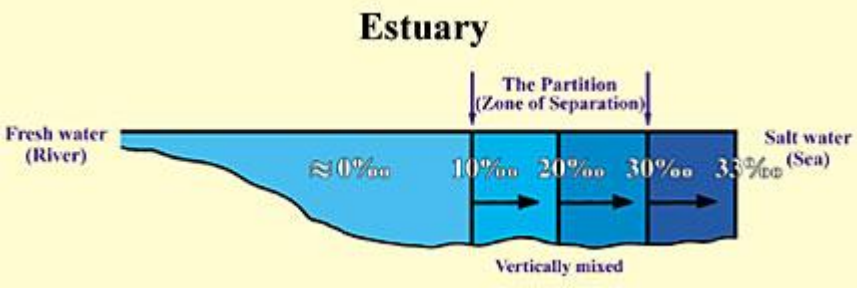


Figure 14: Longitudinal section showing salinity (parts per thousand ‰) in an estuary. We can see here the partition (zone of separation) between the fresh and the salt water. (*Introductory Oceanography*, Thurman, p. 301, with a slight enhancement.)

This information has been discovered only recently, using advanced equipment to measure temperature, salinity, density, oxygen dissolubility, etc. The human eye cannot see the difference between the two seas that meet, rather the two seas appear to us as one homogeneous sea. Likewise, the human eye cannot see the division of water in estuaries

into the three kinds: fresh water, salt water, and the partition (zone of separation).

3.4 The Qur'ān on Deep Seas and Internal Waves:

God has said in the Qur'ān: 24: 40:

﴿ Or (the unbelievers' state) is like the darkness in a deep sea. It is covered by waves, above which are waves, above which are clouds. Darknesses, one above another. If a man stretches out his hand, he cannot see it.... ﴾

This verse mentions the darkness found in deep seas and oceans, where if a man stretches out his hand, he cannot see it. The darkness in deep seas and oceans is found around a depth of 200 meters and below. At this depth, there is almost no light (see figure 15). Below a depth of 1000 meters there is no light at all.[1] Human beings are not able to dive more than forty meters without the aid of submarines or special equipment. Human beings cannot survive unaided in the deep dark part of the oceans, such as at a depth of 200 meters.

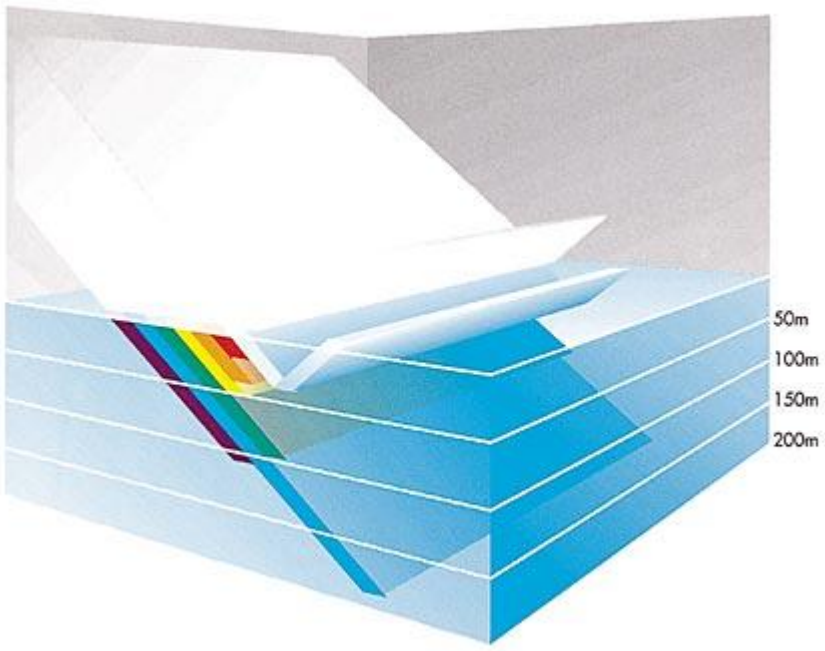
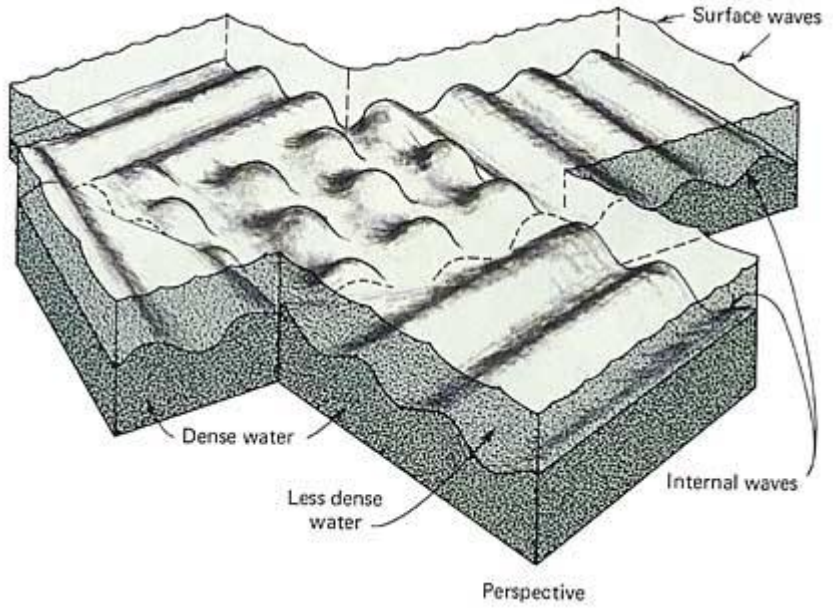


Figure 15: Between 3 and 30 percent of the sunlight is reflected at the sea surface. Then almost all of the seven colors of the light spectrum are absorbed one after another in the first 200 meters, except the blue light. (*Oceans,* Elder and Pernetta, p. 27.)

Scientists have recently discovered this darkness by means of special equipment and submarines that have enabled them to dive into the depths of the oceans.

We can also understand from the following sentences in the previous verse, **"...in a deep sea. It is covered by waves, above which are waves, above which are clouds...."**, that the deep waters of seas and oceans are covered by waves, and above these waves are other waves. It is clear that the second set of waves are the surface waves that we see, because the verse mentions that above the second waves there are clouds. But what about the first waves? Scientists have recently discovered that there are internal waves which "occur on density interfaces between layers of different densities." (see figure 16).



The internal waves cover the deep waters of seas and oceans because the deep waters have a higher density than the waters above them. Internal waves act like surface waves. They can also break, just like surface waves. Internal waves

cannot be seen by the human eye, but they can be detected by studying

temperature or salinity changes at a given location.

Self - Assessment Exercise
Provide and analyze the Qur'ānic hints on Deep Seas and Internal Waves.

4.0 CONCLUSION

Q. 55: 19 – 20, Q.25:53 and Q.78: 6 -9 all contain scientific hint on partition and barrier between seas, oceans and others. Q.16:15 hints on mountains having deep roots and serving as pegs for the earth. All these scientific hints in the Qur'ān which have been later confirmed by modern science proved the divine and miraculous nature of the Quran. …

5.0 SUMMARY

In this Unit you are taken across several *Qur'ān*ic verses on some natural phenomena such as the darkness found in deep seas, partitions and barriers between aquatic phenomena, mountains having roots and serving as pegs for the earth. The Unit also contains views of eminent scientists confirming the authenticity of the Qur'ānic theories.

6.0 TUTOR – MARKED ASSIGNMENT

1. Identify some passages of the Quran relating to aquatic science, and then Expatiate.
3. Discuss the scientific implication od Quranic statemens relating to the mountains.

8.0 Reference/Further Readings

1. Ibrahim I.A. (1997). *A Brief Illustrated Guide to Understanding Islam*, Darussalam, Houston, Texas, U.S.A.
2. Maurice Bucaille (1976), *The Bible, the Quran and Science,* Seglers, Paris.
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5. Muhammad Iqbal, *Reconstruction of Religious Thought in Islam*, Muhammad Ashraf, Lahore, 1968.

UNIT 5: THE QUR'ĀN AND CLOUDS

CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Contents
3.1 Steps culumunbus cloud goes through in the process of rain production
3.2 Two Verses of the Qur'ān on the process of rain production.
4.0 Conclusion
5.0 Summary
6.0 Tutor – Marked Assignment
1.0 References / Further Readings

1.0 INTRODUCTION

2.0 OBJECTIVES

At the end of this Unit you should be able to:

Expatiate on scientists discoveries on formation and shaping of rain clouds

Mention and comment on some verses of the Qur'ān relating to meteorology.

3.0 MAIN CONTENT

3.1 Steps Cumulonimbus Cloud Goes Through in the Process of Rain Production

Scientists have studied cloud types and have realized that rain clouds are formed and shaped according to definite systems and certain steps connected with certain types of wind and clouds.

One kind of rain cloud is the cumulonimbus cloud. Meteorologists have studied how cumulonimbus clouds are formed and how they produce rain, hail, and lightning.

They have found that cumulonimbus clouds go through the following steps to produce rain:

1) The clouds are pushed by the wind: Cumulonimbus clouds begin to form when wind pushes some small pieces of clouds (cumulus clouds) to an area where these clouds converge (see figures 17 and 18).

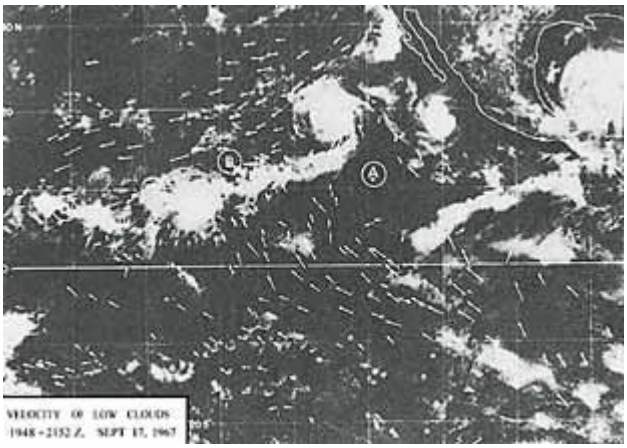

Figure 17: Satellite photo showing the clouds moving towards the convergence areas B, C, and D. The arrows indicate the directions of the wind. (*The Use of Satellite Pictures in Weather Analysis and Forecasting*, Anderson and others, p. 188.)

Figure 18: Small pieces of clouds (cumulus clouds) moving towards a convergence zone near the horizon, where we can see a large cumulonimbus cloud. (*Clouds and Storms*, Ludlam, plate 7.4.)

2) Joining: Then the small clouds join together forming a larger cloud[1] (see figures 18 and 19).

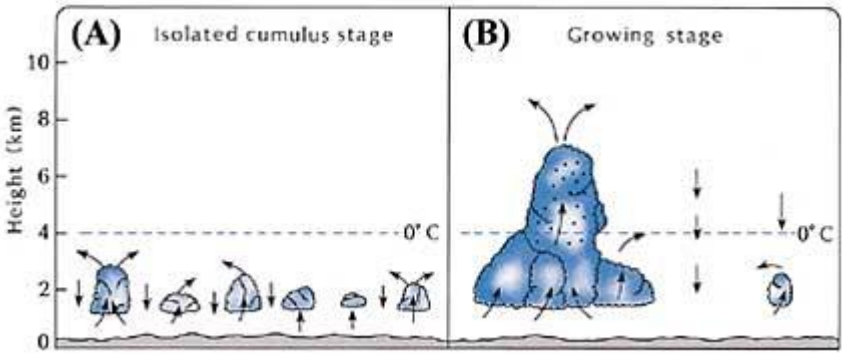

Figure 19: (A) Isolated small pieces of clouds (cumulus clouds). (B) When the small clouds join together, updrafts within the larger cloud increase, so the cloud is stacked up. Water drops are indicated by •. (*The Atmosphere*, Anthes and others, p. 269.)

3) Stacking: When the small clouds join together, updrafts within the larger cloud increase. The updrafts near the center of the cloud are stronger than those near the edges.[2] These updrafts cause the cloud body to grow vertically, so the cloud is stacked up (see figures 19 (B), 20, and 21). This vertical growth causes the cloud body to stretch into cooler regions of the atmosphere, where drops of water and hail formulate and begin to grow larger and larger. When these drops of water and hail become too heavy for the updrafts to support them, they begin to fall from the cloud as rain, hail, etc.[3]

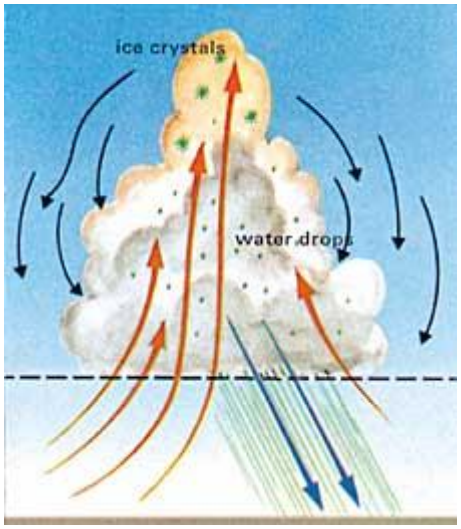

Figure 20: A cumulonimbus cloud. After the cloud is stacked up, rain comes out of it. (*Weather and Climate*, Bodin, p.123.)

Figure 21: A cumulonimbus cloud. (*A Colour Guide to Clouds*, Scorer and Wexler, p. 23.)

God has said:

﴿ Have you not seen how God makes the clouds move gently, then joins them together, then makes them into a stack, and then you see the rain come out of it.... ﴾ (Qur'ān, 24:43)

Meteorologists have only recently come to know these details of cloud formation, structure, and function by using advanced equipment like planes, satellites, computers, balloons, and other equipment, to study wind and its direction, to measure humidity and its variations, and to determine the levels and variations of atmospheric pressure.

The preceding verse, after mentioning clouds and rain, speaks about hail and lightning:

﴿ ....And He sends down hail from mountains (clouds) in the sky, and He strikes with it whomever He wills, and turns it from whomever He wills. The vivid flash of its lightning nearly blinds the sight. ﴾ (Quran, 24:43)

Meteorologists have found that these cumulonimbus clouds, that shower hail, reach a height of 25,000 to 30,000 ft (4.7 to 5.7 miles),[5] like mountains, as the Quran said, **"...And He sends down hail from mountains (clouds) in the sky..."** (see figure 21 above).

This verse may raise a question. Why does the verse say **"its lightning"** in a reference to the hail? Does this mean that hail is the major factor in producing lightning? Let us see what the book entitled *Meteorology Today* says about this. It says that a cloud becomes electrified as hail falls through a region in the cloud of supercooled droplets and ice crystals. As liquid droplets collide with a hailstone, they freeze on contact and release latent heat. This keeps the surface of the hailstone warmer than that of the surrounding ice crystals. When the hailstone comes in contact with an ice crystal, an important phenomenon occurs: electrons flow from the colder object

toward the warmer object. Hence, the hailstone becomes negatively charged. The same effect occurs when super cooled droplets come in contact with a hailstone and tiny splinters of positively charged ice break off. These lighter positively charged particles are then carried to the upper part of the cloud by updrafts. The hail, left with a negative charge, falls towards the bottom of the cloud, thus the lower part of the cloud becomes negatively charged. These negative charges are then discharged as lightning. We conclude from this that hail is the major factor in producing lightning.

This information on lightning was discovered recently. Until 1600 AD, Aristotle's ideas on meteorology were dominant. For example, he said that the atmosphere contains two kinds of exhalation, moist and dry. He also said that thunder is the sound of the collision of the dry exhalation with the neighboring clouds, and lightning is the inflaming and burning of the dry exhalation with a thin and faint fire. These are some of the ideas on meteorology that were dominant at the time of the Quran's revelation, fourteen centuries ago.

4.0 CONCLUSION Have you not seen how God makes the clouds move gently, then joins them together, then makes them into a stack, and then you see the rain come out of it... (Qur'ān, 24:43) and ...And He sends down hail from mountains (clouds) in the sky, and He strikes with it whomever He wills, and turns it from whomever He wills. The vivid flash of its lightning nearly blinds the sight (Qur'ān, 24:43) respectively are two other scientific statements in the holy scripture of Islam on clouds, hails and rain. The findings of scientists using modern sophisticated meteorological equipment have not shown ideas much contrary to these. Man should therefore accept the miraculous nature of Qur'ān and divinity of the mission of the Prophet of Islam.

5.0 SUMMARY

This Unit identifies and analyzes Quranic verses containing hints on formation of clouds, hails and rains. The conclusion in the Unit suggests agreement between the Quranic scientific hints and discoveries of meteorologists using sophisticated equipment in our contemporary times.

6.0 TUTOR – MARKED ASSIGNMENTS

Analyze the three steps cumulonimbus go through to produce rain.

Give two Quranic verses relating to meteorological processes and comment fully on them.

7.0 REFERENCE/FURTHER READINGS

1. Ibrahim I.A. (1997). *A Brief Illustrated Guide to Understanding Islam*, Darussalam, Houston, Texas, U.S.A.

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MODULE 2

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UNIT 1: THE QURAN AND THE VEGETABLE KINGDOM

CONTENTS

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3.1.1 The Vegetable Kingdom
3.1.2 Reproduction in Vegetable Kingdom
3.2 The Animal Kingdom
3.2.1 Reproduction in the Animal Kingdom
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
7.0 References/ Further Readings

1.0 INTRODUCTION

Numerous verses describing the origins of certain aspects of the vegetable kingdom. The grouping of verses scattered throughout the Book affords a general view of the data the Qur'ān contains on these subjects.

In the case of the vegetable kingdom which is the subject of this unit, the examination of the Quranic text has sometimes been particularly delicate on account of certain difficulties inherent in the vocabulary. These have only been overcome through the fact that available scientific data which have a bearing on the subject have been taken into consideration. It is particularly so in the case of living beings, i.e. animal, vegetable and human, where a confrontation with the teachings of science is shown to be indispensable in the search for the meaning of certain statements on these topics contained in the Quran.

2.0 OBJECTIVES

At the end of this unit, you will be able to:
Re-emphasise the origin of life from the Quran perspective.
Give account of Quran statements on effect of rain on vegetation.
Analyze reproduction in the vegetable kingdom from the Quranic verses.

3.0 MAIN CONTENTS

3.1 The Origins of Life

--sura 21, verse 30:

"Do not the Unbelievers see that the heavens and the earth were joined together, then We clove them asunder and We got every living thing out of the water. Will they then not believe?"

The phrase ’we got every living thing out of water ’ (made water as its essential component) or that every living thing originated in water. The two possible meanings are strictly in accordance with scientific data. Life is in fact of aquatic origin and water is the major component of all living cells. Without water, life is not possible. When the possibility of life on another planet is discussed, the first question is always: does it contain a sufficient quantity of water to support life?

Modern data lead us to think that the oldest living being must have belonged to the vegetable kingdom. Organisms belonging to the animal kingdom probably appeared slightly later. they too came from the sea.

What has been translated here by 'water' is the word ma' which means both water in the sky and water in the sea, plus any kind of liquid. In the first meaning, water is the element necessary to all vegetable life:

-sura 20, verse 53 is another statement worth consideration in this regard.
"(God is the One Who) sent water down from the sky and thereby We brought forth pairs of plants each separate from the other."

This is the first reference to the notion of a pair in the vegetable kingdom. We shall return to this later.

In the second meaning, a liquid without any further indication of what kind, the word is used in its indeterminate form to designate what is at the basis of the formation of all animal life:

-sura 24, verse 45:

"God created every animal from water."

We shall see further on how this word may also be applied to seminal fluid [It is secreted by the reproductive glands and contains spermatozoons.].

Whether it deals therefore with the origins of life in general, or the element that gives birth to plants in the soil, or the seed of animals, all the statements contained in the Qur'ān on the origin of life are strictly in accordance with modern scientific data. None of the myths on the origins of life that abounded at the time the Quran appeared are mentioned in the text.

Self Assessment Exercise
Identify the significance of water to living things.

3.1.1 Effect of Rain on Vegetation

It is not possible to quote in their entirety all the numerous passages in the Qur'ān in which divine Beneficence is referred to concerning the effect of the rain which makes vegetation grow. Here are just three verses on this subject:

--sura 16, verses 10 and 11:
"(God) is the One Who sends water down from the sky. For you this is a drink and out of it (grow) shrubs in which you let (cattle) graze freely. Therewith for you He makes sown fields, olives, palm-trees, vineyards and all kinds of fruit grow."

--sura 6, verse 99:
"(God) is the One Who sent water down from the sky. Therewith We brought forth plants of all kinds and from them the verdure and We brought forth from it the clustered grains, and from the palm-tree its spathes with bunches of dates (hanging) low, the gardens of grapes, olives and pomegranates similar and different. Look at their fruit, when they bear it, and their ripening. Verily, in that there are signs for people who believe."

--sura 50, verses 9-11:
"We sent down from the sky blessed water whereby We caused to grow gardens, grains for harvest, tall palm-trees with their spathes, piled one above the other-sustenance for (Our) servants. Therewith We give (new) life to a dead land. So will be the emergence (from the tombs)."

The Qur'ān adds to these general data others that refer to more specialized subjects:

Balance in the Vegetable Kingdom

--sura 15, verse 19:

"The earth . . . We caused all kinds of things to grow therein in due balance."

The Different Qualities of Various Foods

--sura 13, verse 4:
"On the earth are adjacent parts; vineyards, sown fields, palm-trees, similar and not similar, watered with the same water. We make some of them more excellent than others to eat and verily in this are signs for wise people."

It is interesting to note the existence of these verses because they show the sober quality of the terms used, and the absence of any description that might highlight the beliefs of the times, rather than fundamental truths.

Self Assessment Exercise
Discuss the role assigned to rain in bringing forth vegetation in the Holy Qur'ān.

3.1.2 Reproduction in the Vegetable Kingdom

What particularly attract the attention of a reader of the Holy Book, however , are the statements concerning reproduction in the vegetable kingdom.

One must bear in mind that there are two methods of reproduction in the vegetable kingdom: one sexual, the other asexual. It is only the first which in fact deserves the term 'reproduction', because this defines a biological process whose purpose is the appearance of a new individual identical to the one that gave it birth.

Asexual reproduction is quite simply multiplication. It is the result of the fragmentation of an organism which has separated from the main plant and developed in such a way as to resemble the plant from which it came. It is considered by Guilliermond and Mangenot to be a 'special case of growth'. A very simple example of this is the cutting. a cutting taken from a plant is placed in suitably watered soil and regenerated by the growth of new roots. Some plants have organs specially designed for this, while others give off spores that behave like seeds, as it were, (it should be remembered that seeds are the results of a process of sexual reproduction).

Sexual reproduction in the vegetable kingdom is carried out by the coupling of the male and female parts of the generic formations united on a same plant or located on separate plants.

This is the only form that is mentioned in the Qur'ān.

-Sura 20, verse 53:
"(God is the One Who) sent water down from the sky and thereby We brought forth pairs

of plants each separate from the other."

'One of a pair' is the translation of *zauj* (plural *azwaj*) whose original meaning is: 'that which, in the company of another, forms a pair'; the word is used just as readily for a married couple as for a pair of shoes.

--sura 22, verse 5:
"Thou seest the grounds lifeless. When We send down water thereon it shakes and grows and puts forth every magnificent pair (of plants)."

--sura 31, verse 10:
"We caused to grow (on the earth) every noble pair (of plants)."

--sura 13, verse 3:
"Of all fruits (God) placed (on the earth) two of a pair."

We know that fruit is the end-product of the reproduction process of superior plants which have the most highly developed and complex organization. The stage preceding fruit is the flower, which has male and female organs (stamens and ovules). The latter, once pollen has been carried to them, bear fruit which in turn matures and frees it seeds. All fruit therefore implies the existence of male and female organs. This is the meaning of the verse in the Quran.

It must be noted that for certain species, fruit can come from non-fertilized flowers (parthenocarpic fruit), e.g. bananas, certain types of pineapple, fig, orange, and vine. They can nevertheless also come from plants that have definite sexual characteristics.

The culmination of the reproductive process comes with the germination of the seed once its outside casing is opened (sometimes it is compacted into a fruit-stone). This opening allows roots to emerge which draw from the soil all that is necessary for the plant's slowed-down life as a seed while it grows and produces a new plant.

A verse in the Quran refers to this process of germination:

--sura 6, verse 95:
"Verily, God splits the grain and the fruit-stone."

The Qur'ān often restates the existence of these components of a pair in the vegetable kingdom and brings the notion of a couple into a more general context, without set limits:

--sura 36, Verse 36:
"Glory be to Him Who created the components of couples of every kind: of what the ground caused to grow, of themselves (human beings) and of what you do not know."

One could form many hypotheses concerning the meaning of the 'things men did not know' in the days of the Prophet Muhammad. Today we can distinguish structures or coupled functions for them, going from the infinitesimally small to the infinitely large, in the living as well as the non-living world. The point is to remember these clearly expressed ideas and note, once again, that they are in perfect agreement with modern science.

Self - Assessment Exercise
Define the scientific terms asexual and sexual reproduction.
Highlight the kinds of reproduction in the vegetable kingdom found in the Quran.

4.0 CONCLUSION

-sura 21, verse 30: emphasizes origin of living things from water-

sura 16, verses 10 and 11: surah 6,verses 99; sura 50, verses 9-11, all provide effects of water on vegetation.

The divine scripture also contains statements on more specialized subjects in the vegetable kingdom such as balance in the vegetable kingdom Q. 15:19 and the different *qualities of Various Foods* Q. 13:4.
Sura 20, verse 53: --sura 22, verse 5: sura 31, verse 10, sura 13, verse 3 are some of the verses in the Quran that contains hints on kinds of reproduction in the vegetable kingdom.

5.0 SUMMARY

In this Unit, emphasis is laid on origin of living things, effect of water on vegetation and kinds of reproduction in the vegetable kingdom as contained in selected verses of the Quran.

5.0 TUTOR – MARKED ASSIGNMENT

Discuss any one of the following in brief:

1. effect of water on vegetation from a Quranic perspective
2. reproduction in the vegetable kingdom and its kind from the Islamic perspective.

7.0 REFERENCES / FURTHER READING

1. Ibrahim I.A. (1997). *A Brief Illustrated Guide to Understanding Islam*, Darussalam, Houston, Texas, U.S.A.
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3. Maurice Bucaille (n.d.) The Qur'ān and Modern Science. U.K.I.M. Dawah Centre.
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UNIT 2: THE QUR'ĀN AND THE ANIMAL KINGDOM

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3.0 Main Content
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    3.4 Statements Concerning Bees, Spiders and Birds
    3.5 The Source of the Constituents of Animal Milk
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
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1.0 INTRODUCTION

There are several questions in the Qur'ān concerning the animal kingdom which are the subject of comments that call for a confrontation with modern scientific knowledge. Here again, however, one would gain an incomplete view of all that the Quran contains on this subject if one were to leave out a passage such as the extract which follows. In this passage, the creation of certain elements in the animal kingdom is described with the purpose of making man reflect upon the divine Beneficence extended to him.

2.0 OBJECTIVES

Enumerate general remarks on useful services of animals contained in Q.16:5&8.
State material and quantity required for reproduction in animals.
Provide Quranic references to the existence of animal communities.
Provide scientific proof of the Quranic statement.
Explain the scientific significance of Quranic references to bees, spider and birds.
Discuss the source of the constituents of animal milk from the Islamic perspectives.
Proof that the Qur'ānic perspective is in strict accordance with the data of modern knowledge.

3.0 MAIN CONTENTS

3.1 General Remark

-sura 16, verses 5 to 8:
"(God) created cattle for you and (you find) in them warmth, useful services and food, sense of beauty when you bring them home and when you take them to pasture. They bear your heavy loads to lands you could not reach except with great personal effort. Verily, your Lord is Compassionate and Merciful; (He created) horses, mules and donkeys for you to ride and for ornament. And He created what you do not know."

Alongside these general remarks, the Qur'ān sets out certain data on highly diversified subjects:
--reproduction in the animal kingdom.
--references to the existence of animal communities.
--statements concerning bees, spiders and birds.
--remarks on the source of constituents of animal milk.

Self - Assessment Exercise
What general remarks on useful services of animals does *Şūrah* 16, verses 5 to 8 contain?

3.2. Reproduction in the Animal Kingdom

This is very summarily dealt with in verses 45 and 46, sura 53:
"(God) fashioned the two of a pair, the male and the female, from a small quantity of liquid when it is poured out."

The 'pair' is the same expression that we have already encountered in the verses which deal with reproduction in the vegetable kingdom. Here, the sexes are given. The detail which is absolutely remarkable is the precision with which it is stated that a small quantity of liquid is required for reproduction. The word itself signifying 'sperm' is used.

Self – Assessment Exercise
State the material and quantity required for reproduction in animals.

3.3 References to the Existence of Animal Communities
--sura 6, Verse 38:
"There is no animal on earth, no bird which flies on wings, that (does not belong to) communities like you. We have not neglected anything in the Book (of Decrees). Then to their Lord they will be gathered."
Blachère states that an older commentator, such as ar-Rāzī, thought that this verse only referred to instinctive actions whereby animals worship God. Sheikh Si Boubakeur Hamza, in the commentary to his translation of the Koran, speaks of "the instinct which, according to Divine Wisdom, pushes all beings to group together, so that they demand that the work of each member serve the whole group."
Animal behaviour has been closely investigated in recent decades, with the result that genuine animal communities have been shown to exist.
It has only been recently however, that the mechanisms which preside over this kind of organization have been discovered for certain species. The most studied and best known case is undoubtedly that of bees, to whose behaviour the name von Frisch is linked. Von Frisch, Lorenz and Tinbergen received the 1973 Nobel Prize for their work in this field.

Self - Assessment Exercise
Expatiate the scientific point Q.6:38 refers to.

3.4 Statements Concerning Bees, Spiders and Birds

When specialists on the nervous system wish to provide striking examples of the prodigious organization directing animal behaviour, possibly the animals referred to most frequently are bees, spiders and birds (especially migratory birds). Whatever the case, there is no doubt that these three groups constitute a model of highly evolved organization.

Bees
In the Qur'ān, bees are the subject of the longest commentary:

--Sura 16, verses 68 and 69:
"Thy Lord inspired the bees: Choose your dwelling in the hills, in the trees and in what (man) built. Eat of all fruit and follow the ways of your Lord in humility. From within their bodies comes a liquor of different colours where is a remedy for men."
It is difficult to know what exactly is meant by the order to follow the ways of the Lord in humility, unless it is to be seen in general terms. All that may be said, with regard to the knowledge that has been gained of their behaviour, is that here-as in each of the three animal cases mentioned as examples in the Qur'ān-there is a remarkable nervous organization supporting their behaviour. It is known that the pattern of a bee's dance is a means of communication to other bees; in this way, bees are able to convey to their own species the direction and distance of flowers from which nectar is to be gathered. The famous experiment performed by von Frisch has shown the meaning of this insect's movement which is intended to transmit information between worker bees.

Spiders
Spiders are mentioned in the Qur'ān to stress the flimsiness of their dwelling which is the most fragile of all. They have a refuge that is as precarious, according to the Qur'ān, as the dwelling of those who have chosen masters other than God.

--sura 29, verse 41:
"Those who choose masters other than God are like the spider when it takes for itself a dwelling. Verily, the flimsiest dwelling is the dwelling of the spider. If they but knew."

A spider's web is indeed constituted of silken threads secreted by the animal's glands and their caliber is infinitely fine. Its fragility cannot be imitated by man. Naturalists are intrigued by the extraordinary pattern of work recorded by the animal's nervous cells, which allows it to produce a geometrically perfect web.

Birds

Birds are frequently mentioned in the Qur'ān. They appear in episodes in the life of Abraham, Joseph, David, Solomon and Jesus. These references do not however have any bearing on the subject in hand.

The verse concerning the existence of animal communities on the ground and bird communities in the sky has been noted above:

--sura 6 verse 38:

"There is no animal on the earth, no bird which flies on wings, that (does not belong to) communities like you. We have not neglected anything in the Book (of Decrees) . Then to their Lord they will be gathered."

Two other verses highlight the birds' strict submission to God's Power.

--sura 16, verse 79:

"Do they not look at the birds subjected in the atmosphere of the sky? None can hold them up (in His Power) except God."

--sura 67, verse 19:

"Have they not looked at the birds above them spreading their wings out and folding them? None can hold them up (in his Power) except the Beneficent." The translation of one single word in each of these verses is a very delicate matter. The translation given here expresses the idea that God holds the birds up in His Power. The Arabic verb in question is *amsaka*, whose original meaning is 'to put one's hand on, seize, hold, hold someone back'.

An illuminating comparison can be made between these verses, which stress the extremely close dependence of the birds' behavior on divine order, to modern data showing the degree of perfection attained by certain species of bird with regard to the programming of their movements. It is only the existence of a migratory programme in the genetic code of birds that can account for the extremely long and complicated journeys which very young birds, without any prior experience and without any guide, are able to accomplish. This is in addition to their ability to return to their departure point on a prescribed date. Professor Hamburger in his book, *Power and Fragility* (La Puissance et la Fragilité) [Pub. Flammarion, 1972, Paris.], gives as an example the well-known case of the 'mutton-bird' that lives in the Pacific, with its journey of over 16,500 miles in the shape of the figure 8 [It makes this journey over a period of six months, and comes back to its departure point with a maximum delay of one week.]. It must be acknowledged that the highly complicated instructions for a journey of this kind simply have to be contained in the bird's nervous cells. They are most definitely programmed, but who is the programmer?

Self – Assessment Exercise

Explain the scientific significance of Quranic references to bees, spiders and birds.

3.5 The Source of the Constituents of Animal Milk

This is defined in the Qur'ān in strict accordance with the data of modern knowledge

(sura 16, verse 66).

The translation and interpretation of this verse given here is that of Maurice Bucaille.

"Verily, in cattle there is a lesson for you. We give you to drink of what is inside their bodies, coming from a conjunction between the contents of the intestine and the blood, a milk pure and pleasant for those who drink it." (sura 16, verse 66)

This interpretation is very close to the one given in the *Muntakhab*, 1973, edited by the Supreme Council for Islamic Affairs, Cairo, which relies for its support on modern physiology.

From a scientific point of view, physiological notions must be called upon to grasp the meaning of this verse.

The substances that ensure the general nutrition of the body come from chemical transformations which occur along the length of the digestive tract. These substances come from the contents of the intestine. On arrival in the intestine at the appropriate stage of chemical transformation, they pass through its wall and towards the systemic circulation. This passage is effected in two ways: either directly, by what are called the 'lymphatic vessels', or indirectly, by the portal circulation. This conducts them first to the liver, where they undergo alterations, and from here they then emerge to join the systemic circulation. In this way everything passes through the bloodstream.

The constituents of milk are secreted by the mammary glands. These are nourished, as it were, by the product of food digestion brought to them via the bloodstream. Blood therefore plays the role of collector and conductor of what has been extracted from food, and it brings nutrition to the mammary glands, the producers of milk, as it does to any other organ.

Here the initial process which sets everything else in motion is the bringing together of the contents of the intestine and blood at the level of the intestinal wall itself. This very precise concept is the result of the discoveries made in the chemistry and physiology of the digestive system. It was totally unknown at the time of the Prophet Muhammad and has been understood only in recent times. The discovery of the circulation of the blood, was made by Harvey roughly ten centuries after the Quranic Revelation.

Maurice Bucaille considers the existence in the Qur'ān of the verse referring to these concepts can have no human explanation on account of the period in which they were formulated.

Self – Assessment Exercise

The source of the constituents of animal milk is defined in the Qur'ān in strict accordance with the data of modern knowledge. Discuss.

4.0 CONCLUSION

Some uses to which cattle can be used are contained in Q.16:5&8.
Q.53:45&46 indicates that it is only a small quantity of liquid (sperm) that is required for reproduction.
Q.6:38 is a scientific statement referring to the existence of animal communities
The source of the constituents of animal milk is defined in the Qur'ān in accordance with the data of modern knowledge.

5.0 SUMMARY

This unit gives a general hint on some uses to which cattle can be used as contained in select verses of the Qur'ān. It provides other verses which indicate that it is only a small quantity of liquid (sperm) that is required for reproduction in animals. It shows how Q.6:38 is a scientific statement referring to the existence of animal communities. It proves that the source of the constituents of animal milk as defined in the Qur'ān is in strict accordance with the data of modern knowledge.

6.0 TUTOR – MARKED ASSIGNMENT

Discuss the scientific significance of Quranic references to bees, spiders and birds.

7.0 REFERENCES / FURTHER READINGS

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UNIT 3: THE QUR'ĀN ON THE CREATION OF MAN AND MATERIAL USED.

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Contents

3.1. Material used for the creation of man, origin of the universe

3.2. The Qur'ān on Human Embryonic Development

3.3. The Qur'ān on the Cerebrum

4.0 Conclusion

5.0 Summary

6.0 Tutor – Marked Assignment

7.0 References/Further Readings

1.0 INTRODUCTION

The attempt in this unit is to examine the relationship between Man and the materials used in his creation. This would touch on the background of his journey and the result of his steward. More importantly the essence of the materials to the Man's sojourn will be examined.

2.0 OBJECTIVES

At the end of this unit you should be able to:

(i) Discuss the creation of Man and materials used for it.

(ii) Analyse Quranic embryology

(iii) Assess the scientific importance of the divine word naseyah.

1.0 MAIN CONTENTS

3.1 Materials used for the Creation of Man

A comprehensive account of man's journey is portrayed in the holy *Qur'ān* 22:5-6 to which cognizance must be taken by any man who deems to be guided. It reads: 'O mankind! If ye have a doubt about the resurrection, (consider) that We created you out of dust, then out of sperm, then out of a leech-like clot, then out of a morsel of flesh, partly formed and partly unformed, in order that We may manifest (Our power) to you; and We caused whom We will to rest in the wombs for an appointed term, then do We bring you out as babes, then (foster you) that ye may reach your age of full strength; and some of you are called to die, and some are sent back to the feeblest old age so that they know nothing after having known (much). And (further), thou sees the earth barren and lifeless, but when We pour down rain on it, it is stirred (to life), it swells, and it puts forth every kind of beautiful growth (in pairs) (5). This is so, because Allah is the Reality: it is He Who gives life to the dead, and it is He Who has power over all things.(6)

In another portion of the holy *Qur'ān*, Allah presents a concise account of man's sojourn. It says 'from the (earth) did We create you, and into it shall We return you. And from it shall We bring you out once again. (Q20:55).

This account is self - explanatory, however, some explanation can be offered regarding the implications of the procedures and the outcome.

How wonderful is human physical growth, from lifeless matter, to seed, fertilized ovum, fetus, child, youth, age, and eventual death! This is similar to dead earth and barren just before Allah's fertilizing showers bring it to life, growth and beauty in various forms. The verse i.e. (6) indicates that the Creator of this pageant of Beauty can surely create yet another and a newer world.

Although the stages of man's growth physically from nothing till he completes the cycle of this life are described in words. These words with their accuracy, beauty and comprehensiveness can only be fully understood by biologists. Parallel to the physical growth is understood in man's inner growth. Major avenues of growth are the reflexes which is a product of hormones and bodily fluid attached to the sense organs. They act, in effect at the man's various actions and reactions. These fluids are mainly water which

is yet another indispensable ingredient of human creation. To this end, *Qur'ān* 21:30 postulates that '…We got every living things out of water. Will they then not believe?'

Human cell – protoplasm is liquid and unstable. Human origin contains 80 – 85% of water. Also 72% of earth surface is covered with water. Therefore, the original basis of living for man and animal is water.

Self - Assessment Exercise

We got every living thing out of water. Discuss.

3.2 The Qur'ān on Human Embryonic Development:

In the Holy *Qur'ān*, God speaks about the stages of man's embryonic development:

﴿ We created man from an extract of clay. Then We made him as a drop in a place of settlement, firmly fixed. Then We made the drop into an *alaqah* (leech, suspended thing, and blood clot), then We made the *alaqah* into a *mudghah* (chewed substance)... ﴾[1] (Quran, 23:12-14)

Literally, the Arabic word *alaqah* has three meanings: (1) leech, (2) suspended thing, and (3) blood clot.

In comparing a leech to an embryo in the '*alaqah* stage, we find similarity between the two as we can see in figure 1. Also, the embryo at this stage obtains nourishment from the blood of the mother, similar to the leech, which feeds on the blood of others. The second meaning of the word *alaqah* is "suspended thing." This is what we can see in figures 2 and 3, the suspension of the embryo, during the *alaqah* stage, in the womb of the mother.

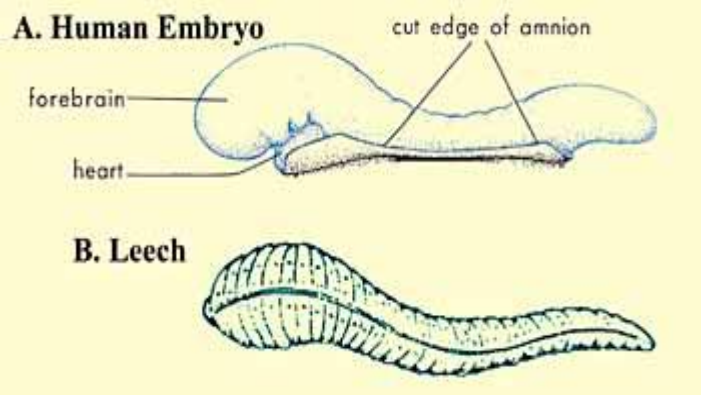


Figure 1: Drawings illustrating the similarities in appearance between a leech and a human embryo at the *alaqah* stage. (Leech drawing from *Human Development as Described in the Quran and Sunnah*, Moore and others, p. 37, modified from *Integrated Principles of Zoology*, Hickman and others. Embryo drawing from *The Developing Human*, Moore and Persaud, 5th ed., p. 73.)

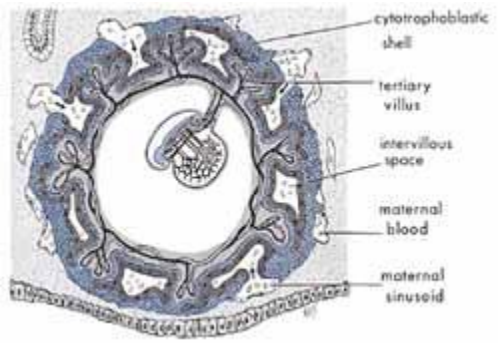
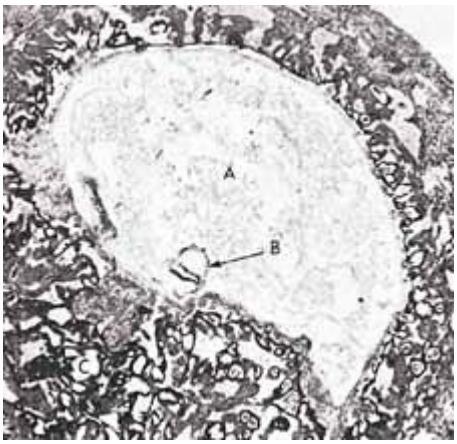


Figure 2: We can see in this diagram the suspension of an embryo during the *alaqah* stage in the womb (uterus) of the mother. (*The Developing Human*, Moore and Persaud, 5th ed., p. 66.)

Figure 3: In this photomicrograph, we can see the suspension of an embryo (marked B) during the *alaqah* stage (about 15 days old) in the womb of the mother. The actual size of the embryo is about 0.6 mm. (*The Developing Human*, Moore, 3rd ed., p. 66, from *Histology*, Leeson



and Leeson.)

The third meaning of the word ‘*alaqah* is “blood clot.” We find that the external appearance of the embryo and its sacs during the ‘*alaqah* stage is similar to that of a blood clot. This is due to the presence of relatively large amounts of blood in the embryo during this stage (see figure 4). Also during this stage, the blood in the embryo does not circulate until the end of the third week. Thus, the embryo at this stage is like a clot of blood.

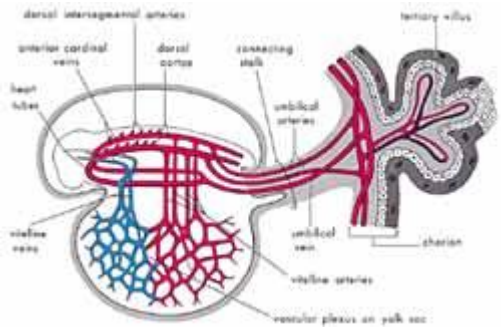


Figure 4: Diagram of the primitive cardiovascular system in an embryo during the *alaqah* stage. The external appearance of the embryo and its sacs is similar to that of a blood clot, due to the presence of relatively large amounts of blood present in the embryo. (*The Developing Human*, Moore, 5th ed., p. 65.)

So the three meanings of the word *alaqah* correspond accurately to the descriptions of the embryo at the *alaqah* stage.

Figure 5: Photograph of an embryo at the *mudghah* stage (28 days old). The embryo at this stage acquires the appearance of a chewed substance, because the somites at the back of the embryo somewhat resemble teeth marks in a chewed substance. The actual size of the embryo is 4 mm. (*The Developing Human*, Moore and Persaud, 5th ed., p. 82, from Professor Hideo Nishimura, Kyoto University, Kyoto, Japan.)

The next stage mentioned in the verse is the *mudghah* stage. The Arabic word *mudghah* means "chewed substance." If one were to take a piece of gum and chew it in his or her mouth and then compare it with an embryo at the *mudghah* stage, we would conclude that the embryo at the *mudghah* stage acquires the appearance of a chewed substance. This is because of the somites at the back of the embryo that "somewhat resemble teeth marks in a chewed substance." (see figures 5 and 6).

How could Muhammad ﷺ have possibly known all this 1400 years ago, when scientists have only recently discovered this using advanced equipment and powerful microscopes which did not exist at that time? Hamm and Leeuwenhoek were the first scientists to observe human sperm cells (spermatozoa) using an improved microscope in 1677 (more than 1000 years after Muhammad ﷺ). They mistakenly thought that the sperm cell contained a miniature preformed human being that grew when it was deposited in the female genital tract.

Professor Emeritus Keith L. Moore is one of the world's most prominent scientists in the fields of anatomy and embryology and is the author of the book entitled *The Developing Human*, which has been translated into eight languages. This book is a scientific reference work and was chosen by a special committee in the United States as the best book authored by one person. Dr. Keith Moore is Professor Emeritus of Anatomy and Cell Biology at the University of Toronto, Toronto, Canada. There, he was Associate Dean of Basic Sciences at the Faculty of Medicine and for 8 years was the Chairman of the Department of Anatomy. In 1984, he received the most distinguished award presented in the field of anatomy in Canada, the J.C.B. Grant Award from the Canadian Association of Anatomists. He has directed many international associations, such as the Canadian and American Association of Anatomists and the Council of the Union of Biological Sciences.

In 1981, during the Seventh Medical Conference in Dammam, Saudi Arabia, Professor Moore said: "It has been a great pleasure for me to help clarify statements in the Qur'ān about human development. It is clear to me that these statements must have come to Muhammad from God, because almost all of this knowledge was not discovered until many centuries later. This proves to me that Muhammad must have been a messenger of God.

Consequently, Professor Moore was asked the following question: "Does this mean that you believe that the Qur'ān is the word of God?" He replied: "I find no difficulty in accepting this. During one conference, Professor Moore stated: "....Because the staging of human embryos is complex, owing to the continuous process of change during development, it is proposed that a new system of classification could be developed using the terms mentioned in the Qur'ān and *Sunnah* (what Muhammad ﷺ said, did, or approved of). The proposed system is simple, comprehensive, and conforms with present embryological knowledge. The intensive studies of the Qur'ān

and *hadeeth* (reliably transmitted reports by the Prophet Muhammad's companions of what he said, did, or approved of) in the last four years have revealed a system for classifying human embryos that is amazing since it was recorded in the seventh century A.D. Although Aristotle, the founder of the science of embryology, realized that chick embryos developed in stages from his studies of hen's eggs in the fourth century B.C., he did not give any details about these stages. As far as it is known from the history of embryology, little was known about the staging and classification of human embryos until the twentieth century. For this reason, the descriptions of the human embryo in the Quran cannot be based on scientific knowledge in the seventh century. The only reasonable conclusion is: these descriptions were revealed to Muhammad from God. He could not have known such details because he was an illiterate man with absolutely no scientific training.

Self - Assessment Exercise

Identify and analyze embryology from the Quranic point of view.

Discuss the view of a prominent scientist in the field of biology on the Quranic statements.

3.2 The Qur'ān on the Cerebrum:

God has said in the Qur'ān about one of the evil unbelievers who forbade the Prophet Muhammad from praying at the Kaaba:

No! If he does not stop, We will take him by the *naseyah* (front of the head), a lying, sinful *naseyah* (front of the head)! (Q. 96:15-16)

Why did the Qur'ān describe the front of the head as being lying and sinful? Why didn't the Qur'ān say that the person was lying and sinful? What is the relationship between the front of the head and lying and sinfulness?

If we look into the skull at the front of the head, we will find the prefrontal area of the cerebrum (see figure 12). What does physiology tell us about the function of this

area? A book entitled *Essentials of Anatomy & Physiology* says about this area, "The motivation and the foresight to plan and initiate movements occur in the anterior portion of the frontal lobes, the prefrontal area. This is a region of association cortex..." Also the book says, "In relation to its involvement in motivation, the prefrontal area is also thought to be the functional center for aggression...."[2]

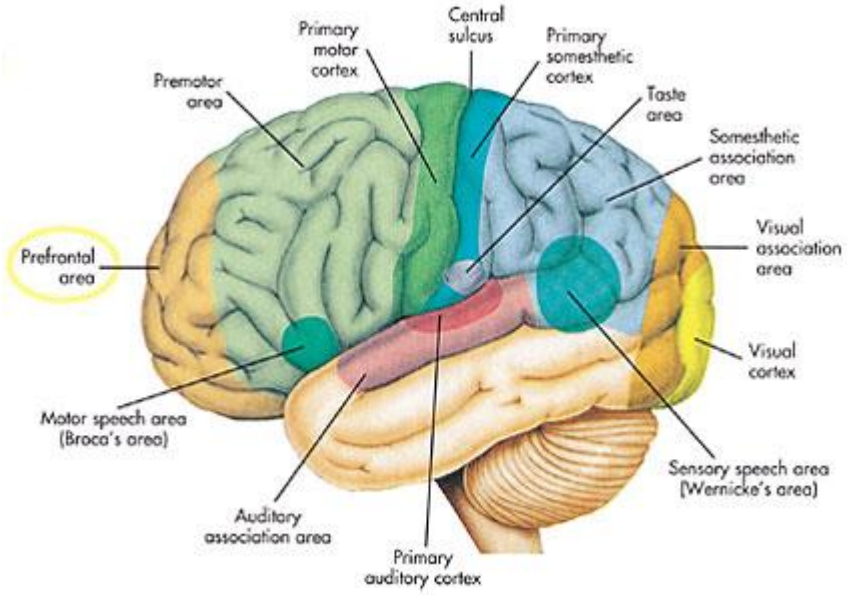


Figure 12: Functional regions of the left hemisphere of the cerebral cortex. The prefrontal area is located at the front of the cerebral cortex. (*Essentials of Anatomy & Physiology*, Seeley et al p. 210.)

So, this area of the cerebrum is responsible for planning, motivating, and initiating good and sinful behavior and is responsible for the telling of lies and the speaking of truth. Thus, it is proper to describe the front of the head as lying and sinful when someone lies or commits a sin, as the Quran has said, **"...A lying, sinful *naseyah* (front of the head)!"**

Scientists have only discovered these functions of the prefrontal area in the last sixty years, according to Professor Keith L. Moore.

Self-Assessment Exercise
What is the scientific significance of the word *naseyah* contained in *Surah Iqra?*

2.0 CONCLUSION

Q. 22: 5-6, Q.20:55 and Q.21:30 contain scientific hints on the creation of man and the materials used for it. Q. 23:12-14 contains scientific hints on human embryonic development in the womb. Q.96:15-16 contains scientific hints on significance of naseyah (the cerebrum)

5.0 SUMMARY

In this Unit you are taken across several *Qur'ān*ic verses on Man's creation. Quranic passages depicting the materials used to create him and the scientific significance of the word naseyah used in Surah Iqra had been brought together and analyzed.

6.0 TUTOR – MARKED ASSIGNMENT

(i) Discuss the scientific significance of the Quranic words :

(i) *'alaqah* (ii) *muđgah* and (iii) *nāsiyah*.

(ii) Provide the Quranic hint on Man's embryonic development.

(iii) Highlight the significance of water in Man's life.

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1. Ibrahim I.A. (1997). *A Brief Illustrated Guide to Understanding Islam*, Darussalam, Houston, Texas, U.S.A.

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UNIT 4: THE QUR'ĀN AND SEX EDUCATION
CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content

4.0 Conclusion

5.0 Summary

6.0 Tutor-Marked Assignment

7.0 References/ Further Readings

1.0 INTRODUCTION

Our epoch believes that discoveries have been made in the field of sex education, and the knowledge of the facts of life which has been opened up to young people is regarded as an achievement of the modern world. The information set out in the Units above is proof, however, that fourteen centuries ago theoretical questions (as it were) on human reproduction were brought to man's attention. This was done as far as was possible, taking into account the fact that the anatomical and physiological data needed for further explanations were lacking. We hereby present Quranic statements bearing on sex education couched in simple language suited to the level of comprehension of learners.

2.0 OBJECTIVES

At the completion of this Unit you should be able to:
Discuss issues relating to sex education in some Quranic statements

3.0 MAIN CONTENT

There are many details in the Qur'ān on the practical side of life in general, and the way man should behave in the many situations of his existence. His sex life is no exception. Two verses in the Qur'ān deal with sexual relations themselves. They are described in terms which unite the need for precision with that of decency. Doctor A. K. Giraud, former Professor at the Faculty of Medicine, Beirut, has the following on this topic:

--sura 86, verse 6 and 7:
"(Man) was fashioned from a liquid poured out. It issued (as a result) of the conjunction of the sexual area of the man and the sexual area of the woman." The sexual area of the man is indicated in the text of the Qur'ān by the word *ṣulb*). The sexual areas of the woman are designated in the Qur'ān by the word *tarā'ib* (plural).
Thus the behavior of a man in his intimate relationships with his wife is stated explicitly. There is the order concerning the menstruation period contained in verses 222 and 223, sura 2; God gives the following command to the Prophet:
--sura 2, verses 222 and 223:
"They (the Believers) question thee concerning menstruation. Say: This is an evil. Keep

away from women during menstruation and do not approach them until they are clean. When they have purified themselves, go to them, as God ordered it to you.
"Verily, God loves the repentant and loves those who purified themselves.
"Your wives are a tilth. Go to your tilth as you will. Do (some good act) for your souls beforehand."
The beginning of this passage is very clear in meaning: It formally forbids a man to have sexual contact with a woman who is having her period. The second part describes the process of tilling which the sower performs before sowing the seed which is to germinate and produce a new plant. Through this image therefore, stress is indirectly laid on the importance of bearing in mind the final purpose of sexual contact, i.e. reproduction.
The orders given here are of a very general kind. The problem of contraception has been raised with regard to these verses: neither here, nor anywhere else, is reference made to this subject.
Nor is provoked abortion referred to. This is so because of the absolute respect of the individual human being, which is referred to so often in the Qur'ān. It brings with it a total condemnation of provoked abortion. This attitude is today shared by all monotheistic religions.
In contrast to this, no exception to the rule is made for pilgrims in Makka during the days of the Pilgrimage rituals.
--sura 2, verse 197:
"For whom undertakes (the duty of) the Pilgrimage in its time, no wooing and no license."
This prohibition is formal, as is the fact that other activities are forbidden, e.g. hunting, fighting, etc.
Menstruation is again mentioned in the Qur'ān in connection with divorce. The Book contains the following verse:
--sura 65, verse 4:
"For your wives who despair of menstruation, if you doubt about them, their period of waiting will be three months. For those who never have their monthly periods and those who are pregnant their period will be until they lay down their burden."
The waiting period referred to here is the time between the announcement of the divorce and the time it comes into effect. Those women of whom it is said 'they despair of menstruation' have reached the menopause. A precautionary period of three months is envisaged for them. Once this period is completed, divorced women who have reached the menopause may remarry.
For those who have not yet menstruated, the pregnancy period has to be awaited. For pregnant women, divorce only comes into effect once the child is born.
All these laws are in perfect agreement with physiological data. One can, furthermore, find in the Qur'ān the same legal provision in the texts dealing with widowhood.
Thus, the theoretical statements dealing with reproduction, and the practical instructions on the sex life of couples, do not contradict and cannot be placed in opposition to the data we have from modern knowledge, nor with anything that can be logically derived from it.

Self - Assessment Exercise
Identify and discuss sexual intercourse related issues taught in the above passage.

4.0 CONCLUSION

In sura 86, verse 6 and 7: the sexual area of the man from where the liquid that forms man issued out is indicated by the word *ṣulb* while that of women are designated by the word *tarā'ib* (plural).
We can deduce from Surah 2 Ayah 222 -223 that final purpose of sexual contact is reproduction; sexual contact with menstruating women is forbidden; so also is provoked abortion.
Sexual relations are permitted at night during the Fast in the month of Ramadan. Q.2.187
In Q.2:197, no exception to the rule is made during the days of the Pilgrimage rituals.
Iddah period of women who have reached menopause is 3 months. The Iddah of those who never have their monthly periods and those who are pregnant is until they deliver.
All these laws and provision for widowhood are in perfect agreement with physiological data in our modern time.

5.0 SUMMARY

The Unit focuses on sexual education in the areas of identification of sexual areas of man and women, reproduction of final purpose of sexual contact, sexual contact with menstruating women, provoked abortion, sex when fasting and during pilgrimage rituals and observance of Iddah.

6.0 TUTOR MARKED ASSIGNMENT

Give a bird's eye view of sex education in Islam.

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MODULE 3:

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UNIT 1: LIST OF MEDIEVAL AND MODERN MUSLIM SCIENTISTS.

Muslim scientists have played a significant role in the history of science. There have been hundreds of notable Muslim scientists who have made contributions to civilization and to society by furthering the development of science in the High Middle Ages.

CONTENTS

- 1 Astronomers and astrophysicists
- 2 Chemists and alchemists
- 3 Economists and social scientists
- 4 Geographers and earth scientists
- 5 Mathematicians
- 6 Biologists, neuroscientists, and psychologists
- 7 Physicians and surgeons
- 8 Physicists and engineers
- 9 Political scientists
- 10 References

Astronomers and astrophysicists

- Ibrahim al-Fazari
- Muhammad al-Fazari
- Al-Khwarizmi, the mathematician
- Ja'faribn Muhammad Abu Ma'shar al-Balkhi (Albumasar)
- Al-Farghani
- Banū Mūsā (Ben Mousa)
    - Ja'far Muhammad ibn Mūsā ibn Shākir
    - Ahmad ibn Mūsā ibn Shākir
    - Al-Hasan ibn Mūsā ibn Shākir
- Al-Majriti
- Muhammad ibn Jābir al-Harrānī al-Battānī (Albatenius)
- Al-Farabi (Abunaser)

- AbūSahl al-Qūhī (Kuhi)
- Ibn al-Haytham (Alhacen)
- Abū Rayhān al-Bīrūnī
- Avicenna (Ibn Sīnā)
- Abū Ishāq Ibrāhīm al-Zarqālī (Arzachel)
- Ibn Bajjah (Avempace)
- IbnTufail (Abubacer)
- Nur Ed-Din Al Betrugi (Alpetragius)
- Averroes
- Ulugh Beg, also a mathematician
- Taqi al-Din Muhammad ibn Ma'ruf, Ottoman astronomer

Chemists and alchemists

- Khalid ibnYazid (Calid)
- Jafar al-Sadiq
- Jābir ibn Hayyān (Geber), father of chemistry
- Abbas Ibn Firnas (ArmenFirman)
- Al-Kindi (Alkindus)
- Al-Majriti
- IbnMiskawayh
- Abū Rayhān al-Bīrūnī
- Avicenna
- Al-Khazini
- Nasir al-Din Tusi
- IbnKhaldun
- Al-Khwārizmī, Algebra, (Mathematics)
- Ahmed H. Zewail, Nobel Prize in Chemistry, 1999
- Abdul Qadeer Khan, Nuclear Scientist - Uranium Enrichment Technologist - Centrifuge Method Expert
- Attaur Rahman, leading scholar in the field of Natural Product Chemistry
- Professor at the University of California, Berkeley

Economists and Social Scientists

- Abu Hanifa an-Nuʿman (699-767), Islamic jurisprudence scholar
- Abu Yusuf (731-798), Islamic jurisprudence scholar
- Al-Saghani (d. 990), one of the earliest historians of science
- Shams al-Mo'aliAbol-hasan Ghaboos ibnWushmgir (Qabus) (d. 1012), economist
- AbūRayhān al-Bīrūnī (973-1048), considered the "first anthropologist" and father of Indology
- Ibn Sīnā (Avicenna) (980–1037), economist
- Ibn Miskawayh (b. 1030), economist

- Al-Ghazali (Algazel) (1058–1111), economist
- Al-Mawardi (1075–1158), economist
- Nasīr al-Dīn al-Tūsī (Tusi) (1201–1274), economist
- Ibn al-Nafis (1213–1288), sociologist
- Ibn Taymiyyah (1263–1328), economist
- Ibn Khaldun (1332–1406), forerunner of social sciences such as demography,H:\Jamaal\Desktop\List_of_Muslim_scientists.htm - cite_note-Mowlana-9 cultural history, historiography, philosophy of history, sociology and economics
- Al-Maqrizi (1364–1442), economist
- Akhtar Hameed Khan, Pakistani social scientist; pioneer of microcredit
- Muhammad Yunus, Nobel Prize winner Bangladeshi economist; pioneer of microfinance
- Shah Abdul Hannan, Pioneer of Islamic Banking in South Asia
- Mahbubul Haq, Pakistani economist; developer of Human Development Index and founder of Human Development Report

Geographers and Earth Scientists

- Al-Masudi, the "Herodotus of the Arabs", and pioneer of historical geography
- Al-Kindi, pioneer of environmental science
- Muhammad al-Idrisi, also a cartographer
- Ahmad ibn Fadlan
- Abū Rayhān al-Bīrūnī, father of geodesy, considered the first geologist and "first anthropologist"
- Avicenna
- Averroes
- IbnJubayr
- Ibn Battuta
- IbnKhaldun

Mathematicians

- Khalid ibnYazid (Calid)
- Muhammad ibn Mūsā al-Khwārizmī (Algorismi) - father of algebra and algorithms
- Abū al-HasanibnAlī al-Qalasādī (1412–1482), pioneer of symbolic algebra
- Al-Kindi (Alkindus)
- Banū Mūsā (Ben Mousa)
- Al-Khwarizmi
- Al-Majriti
- Muhammad ibn Jābir al-Harrānī al-Battānī (Albatenius)
- Al-Farabi (Abunaser)
- Brethren of Purity

- Ibn al-Haytham (Alhacen/Alhazen)
- Abū Rayhān al-Bīrūnī
- Abū Ishāq Ibrāhīm al-Zarqālī (Arzachel)
- Omar Khayyám
- Ibn Bajjah (Avempace)
- Al-Ghazali (Algazel)
- Ibn Rushd (Averroes)
- Ibn Sīnā (Avicenna)
- Ja'far ibn Muhammad Abu Ma'shar al-Balkhi (Albumasar)
- Maryam Mirzakhani
- Nasir al-Din al-Tusi, 13th century Persian mathematician and philosopher

Biologists, neuroscientists, and psychologists

- Ibn Sirin (654–728), author of work on dreams and dream interpretation
- Al-Kindi (Alkindus), pioneer of psychotherapy and music therapy
- Ali ibn Sahl Rabban al-Tabari, pioneer of psychiatry, clinical psychiatry and clinical psychology
- Ahmed ibnSahl al-Balkhi, pioneer of mental health, medical psychology, cognitive psychology, cognitive therapy, psychophysiology and psychosomatic medicine
- Al-Farabi (Alpharabius), pioneer of social psychology and consciousness studies
- Ali ibn Abbas al-Majusi (Haly Abbas), pioneer of neuroanatomy, neurobiology and neurophysiology
- Abu al-Qasim al-Zahrawi (Abulcasis), pioneer of neurosurgery
- Ibn al-Haytham (Alhazen), founder of experimental psychology, psychophysics, phenomenology and visual perception
- AbūRayhān al-Bīrūnī, pioneer of reaction time
- Avicenna (IbnSīnā), pioneer of neuropsychiatry,[31]thought experiment, self-awareness and self-consciousness
- IbnZuhr (Avenzoar), pioneer of neurology and neuropharmacology]
- Averroes, pioneer of Parkinson's disease
- IbnTufail, pioneer of tabula rasa and nature versus nurture
- Mir Sajad, Neuroscientist and pioneer in neuroinflammation and neurogenesis.

Physicists and engineers

- Jafar al-Sadiq, 8th century
- Banū Mūsā (Ben Mousa), 9th century
- Abbas IbnFirnas (ArmenFirman), 9th century
- Al-Saghani, 10th century
- Abū Sahl al-Qūhī (Kuhi), 10th century
- IbnSahl, 10th century
- IbnYunus, 10th century

- Al-Karaji, 10th century
- Ibn al-Haytham (Alhacen), 11th century Iraqi scientist, father of optics, pioneer of scientific method[37] and experimental physics, considered the "first scientist"[]
- AbūRayhān al-Bīrūnī, 11th century, pioneer of experimental mechanics
- IbnSīnā (Avicenna), 11th century
- Al-Khazini, 12th century
- Ibn Bajjah (Avempace), 12th century
- Ibn Rushd (Averroes), 12th century Andalusian mathematician, philosopher and medical expert
- Al-Jazari, 13th century civil engineer, father of robotics,
- Nasir al-Din Tusi, 13th century
- Qutb al-Din al-Shirazi, 13th century
- Kamāl al-Dīn al-Fārisī, 13th century
- Ibn al-Shatir, 14th century
- Taqi al-Din Muhammad ibnMa'ruf, 16th century
- HezarfenAhmetCelebi, 17th century
- LagariHasanÇelebi, 17th century
- Sake Dean Mahomet, 18th century
- Fazlur Khan, 20th century Bangladeshi mechanician
- Mahmoud Hessaby, 20th century Iranian physicist
- Ali Javan, 20th century Iranian physicist
- BacharuddinJusufHabibie, 20th century Indonesian aerospace engineer and president
- Abdul Kalam, Indian aeronautical engineer and nuclear scientist
- Mehran Kardar, Iranian theoretical physicist
- CumrunVafa, Iranian mathematical physicist
- Nima Arkani-Hamed, American-born Iranian physicist
- Munir Nayfeh Palestinian-American particle physicist
- Abdus Salam, Pakistani Theoretical Physicist, First Muslim scientist Nobel Laureate
- Riazuddin, Pakistani theoretical physicist
- Abdul Qadeer Khan, Pakistani nuclear scientist
- Abdus Salam, 1st Pakistani theoretical physicist who won the Nobel Prize in Physics
- Ali Musharafa, Egyptian nuclear physicist
- Sameera Moussa, Egyptian nuclear physicist
- Munir Ahmad Khan, Father of Pakistan's nuclear program
- ShahidHussainBokhari, Pakistani researcher in the field of parallel and distributed computing
- KerimKerimov, a founder of Soviet space program, a lead architect behind first human spaceflight (Vostok 1), and the lead architect of the first space stations (Salyut and Mir)

- Farouk El-Baz, a NASA scientist involved in the first Moon landings with the Apollo program

Political scientists

- Sayed Qutb
- Mohammad Baqir al-Sadr
- Abul Ala Maududi
- Hasan al-Turabi
- Hassan al-Banna
- Mohamed Hassanein Haykal
- Umar Mukhtair
- Nooruddin Zenghi
- Salauddin Ayubī
- Maulana Abdul Kalam Azad

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UNIT 2: VARIOUS SCIENCES ASSOCIATED WITH ISLAM

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content

3.1 The Development of Arts and Sciences by the Muslims

3.2 The Branches of Science/Culture Enhanced by Islam or the Early Muslim Scientists

4.0 Conclusion

5.0 Summary

6.0 Tutor-Marked Assignment

7.0 References/ Further Readings

1.0 INTRODUCTION

In this unit attempt is made to understand the different sciencesassociated with Islam. The great impact of Muslim scholars on westernscholars and their students, when the nations of Europe began to awakefrom their condition of intellectual backwardness and set out to learnfrom the Muslims in various scientific discoveries and innovation whichthe Islamic background has engendered.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

· Trace the development of Arts and sciences by the Muslims;

· Explain the scientific achievements of various scholars in Islam;

· Highlight the branches of science or culture enhanced by Muslim scientists.

3.0 MAIN CONTNET

3.1 The Development of Arts and Sciences by the Muslims

The latest researches of Muslims and non-Muslim scholars are bringing to bear on the work of Muslims in the various branches of knowledge throughout the Middle Ages. Of special note among the works are the *Encyclopaedia of Islam* and Sarton's *Introduction to the History ofScience.* On a thorough study of information available on the subject, M.M. Sherif asserts that one is struck by the magnitude as well as importance of the contributions made by Muslims to the various branches of science, especially to mathematics and astronomy. From the 9th to the 13th centuries, Muslims were acknowledged as the world leaders in the development of the Arts and Sciences. Among the arts, poetry, calligraphy and architecture were highly prized while Mosques and other buildings remain which express the Islamic ideas of beauty and harmony. The love of beauty also found expression in artefacts for daily use and decoration; ceramics, metalware, glassware and in production of fine fabrics and decorated carpet. The design of cities developed distinctive Islamic features, including mosque, schools, markets, bath houses, hospitals, caravans and private houses based around central courtyards with gardens, tree and fountains. Visitors from Europe and other lands at this period used to marvel at the comforts and luxuries available in the Muslim world, and at the general state of cleanliness and development, which owed much to the encouragement given by Islamic teachings both to hygiene and to technological improvements. Philosophy and science sprang to life again as the Muslim scholars translated, commented on and developed almost every field of study: Mathematics, Chemistry, Physics, Botany, Zoology, astronomy, Geography, Medicine, animal husbandry, mechanics, sociology and political disciplines, philosophy of history, law, ethics, jurisprudence, grammar and theology. According to the Enclopaedia Britannica: Muslim scholars calculated the angle of the ecliptic, measures the size of the Earth, calculated the possession of the Equinoxes, invented the pendulum clock, explained in the field of optics and physics, such phenomena as refraction of light, gravity, capillary attraction and tuilight. Used the globe

in teaching the geography of a round earth, and developed observations for the empirical study of the heavenly bodies. (*Enclopaedia Britannica*). They made advances in the uses of drugs, herbs and foods for medication, established hospitals, with a system of interns and externs, discovered the causes of certain diseases and developed correct diagnoses of them, proposed new concepts of hygiene, made use of anaesthetics in surgery with newly innovated surgical tools, and introduced the science of dissection in Anatomy. They furthered the scientific breeding of horses and cattle, found new ways of grafting to produce new types of flowers and fruits, introduced new concepts of irrigation, fertilization and soil cultivation, and improved on the science of navigation.

In the area of chemistry, Muslim scholarship led to the discovery of such substances as potash, alcohol, nitrate of silver, nitric acid, sulphuric acid and mercury chloride. It also developed to a high degree of perfection the arts of textiles, ceramics and metallurgy. In mathematics the Arabs adopted the concept of zero from the Indians, which enabled them to develop new areas of mathematics. Some mathematics processes retain their Arabic names today, such as al-Jabr (Algebra). Similarly, in chemistry, words like "alcohol" and "al kali" derive from their Arabic names al-kahl and al-qaliy respectively.

3.2 Branches of Science or Culture Enhanced By Muslims

3.2.1 Medical Science

According to the word of Dr. Meyerhof: Muslim doctors laughed at the crusaders medical attendants for their clumsy and elementary efforts. The Europeans had not the advantage of the books of Avicenna, Jaber, Hassan bin Haythan, Rhazes. However, they finally had them translated into Latin. These translations exist still, without the translators names. In the 16th century the book of Averroes (Ibn Rushd) and Avicenna (Ibn Sina) were put out in Latin translation in Italy and used as thebasis of instruction in the Italian and French Universities. (Meyerhof:132). The works of Avicenna were taken up after the death of Rhazes. His influence on thought and philosophy and general science was profound, and his medical works (based on the works of Galen which he had found in the Samarqand

library in Arabic translation) had a sensational outreach. Andalusia, Abbas the Irani, Ali Ibn Rezvan of Egypt, Ibn Butlan of Baqhdad, Abu Mansur Muwaffaq, Ibn Wafeed of Spain, Masooya of Baghdad, Ali Ibn Issa of Baghdad, Ammar of Mosul, Ibn Rushd (Averroes) of Andalusia, whose works translated to Latin were used in European universities. Europe knew nothing of the cholera bacterium when Islam entered Spain, and the people there regarded the disease as a punishment sent from heaven to exact the penalty of sins, but Muslim physicians had already proved that even the bubonic plaque was a contagious disease and nothing else.

One of the most progressive physicians of Islam called Muhammad Ibn Zakariah Razi (Rhazes), was the author of 200 treatises and books which worth studying today especially his:

1. “Smallpox and measles” (published in Latin and other European tongues in 40 editions between 1497 and 1866 and

2. “The Great Encylopaedia” known as the most authoritative work on the eye and its ailments and treatment for centuries, one of the nine basic works on which Paris University composed its medical course in 1394 A.D. Sugery made similar progress in the hands of Islamic practitioners, who even used anesthetics, though these are assumed to be a modern origin. They employed a henbane base. Among Rhazes innovations was the use of cold water to treat persistent fever, of dry – cupping for apoplexy, of mercury ointment and animal qut for wound sutures, and many others. The greatest of Islamic surgeons was Abu’l-Qasem of Andalusia, affectionately called Abul- Qays, and sometimes Abul-Qasees, floruit 11th century A.D. inventor of very many surgical instruments and author of books. His books were translated and printed in innumerable editions in Latin and used all over Europe, the last such edition being in 1816. (Sayid Mujta, n.d. pp.
76-77).

3.2.2 Pharmacology

Modern European pharmacologist who have studied the history of their profession find that Muslim doctors launched many of the modern beneficial specifics centuries ago, made as science of pharmacology and compound cures, and set up the first pharmacies on the modern model. Baghdad alone had 60 Chemists shops dispensing prescriptions regularly at the changes of the caliph. Evidence of this fact can be seen in the names given in Europe to quite a number of medicines and herbs which betray their Arabic, Indian or Persian origin "such are "alcohol, alkali, alkaner, apricot, arisenic," to mention but a few. Muslim doctors invented the art of mixing chemical medicaments in pills and solutions, many of which are in use to this day, though some of them are claimed as wholly new inventions of our present century by chemists unaware of their distinguished history. Islam had dispensaries which filled prescriptions for patients graits, and in parts of countries where no hospitals existed, physicians paid regular visits with all the tools of their trade to look after public health.

3.2.3 Mathematics

The Arabs started work on arithmetic in the second/eight century. Their first task in this field was to systematize the use of the Hindus minerals which are now permanently associated with their names. Obviously, this was an immense advance on the method of depicting numbers by the letters of the alphabet which was universal up to that time and which prevailed in Europe even during the Middle Ages. The rapid development in mathematics in the subsequent ages could not have taken place without the use of numerals, particularly zero without which all but the simplest calculations become too cumbersome and unmanageable. The zero was mentioned for the first time in the arithmetical work of al-khawarizini written early in the third/ninth century. The Arabs did not confine their arithmetic to integers only, but also contributed a great deal to the rational numbers consisting of fractions. This was the first extension of the domain of numbers, which, in its logical development, led to the real, complex and hyper complex numbers constituting a great part of modern analysis and algebra. They also developed the principle of error which is employed in solving algebraic problems arithmetically.

Al – Biruni (363 – 432/973-1040), Ibn Sina (370-428/980-1037), Ibn al – Samh d 427/1035), Muhammad Ibn Hussain al-Karkhi (d.410/1019 or420/1029), abu sa'id al Sijzi (c.340-c.415/c951-1024) are some of the arithmeticians who worked on the higher theory of numbers and developed the various types of numbers. The Arabs also solved the famous problem of finding a square which, on the addition and subtraction of a given number, yields other squares.

3.2.4 Chemistry

Jabir bn Hayyan (721-815 A.C.) a disciple of the sixth Iman al Jafar al- Sadiq, became known worldwide as "the father of Chemistry" and of Arab alchemy. His influence on western chemistry and alchemy was profound and long lasting. Some of his famous books on alchemy are the Book of Mercy, the Book of Concentration, the Book of Kingdom and the Book of Balances. "We find in them remarkably sound views on method of chemical research" says George Sarton. Among Jabir's studies were the geological formation of metals, refinement of metals, preparation of steel, dying of cloth and leather, varnishes to waterproofcloth and protect iron, the use of manganese dioxide in making glass,the use of iron pyrites for writing in gold, distillation of vinegar toconcentrate acetic acid, and the magnetic force. He also did work oncalcination, reduction, evaporation, sulbimation, distillation, meetingand crystallization. He was familiar with the preparation of a number ofbasic substances and their compounds.More than 500 of his works have been put into print and for the mostpart are to be found among the treasures of the national libraries of Parisand Berlin, while the servants of Europe nicknamed him affectionatelyas 'Wisdom's professor' and attributed to him the discovery of 19 of theelements with their specific weights, etc. Jabir says all can be tracedback to a simple basic particle composed of a charge of lightning(electricity) and fire, the atom, or smallest indivisible unit of matter,very close to modern atomic science. In this way jabir exerted stronginfluence in the development of modern Chemistry.

3.2.5 Astronomy

The astronomical observation recorded in Ma'mun's time in connectionwith the equinoxes, the eclipses, the apparitios of the comets and othercelestial phenomena were unprecedented. The size of the earth wascalculated from the measurement of a degree on the shores of the Redsea. Apparently, this was the time when Christian Europe was assertingthe flatness of the earth.Abu'l Hassan invented the telescope, of which he speaks "a tube to theextremities of which were attached diopters." These "tubes" wereimproved and used afterwards in the observatories of Maragha andCairo with huge success.Innumerable works on arithmetic, geometry, philosophy, astronomy,meteorology, optics, mechanics, medicine, etc were compiled and madeavailable to the public. Indeed, the first observatory in Islam was established by Ma'mun at Shamassia on the plains of Tadmor whileseveral others were created afterwards at Wasit, Apamea, etc. Sharif's*History of Muslim Philosophy* is replete with a number of observatorieserected by Muslims all over their vast empire. (See Sharif; 1966: 1284)

3.2.6 Mechanical Engineering

Ibn firnas (died 883) was an aggressive builder of engines. Many otherMuslim engineers left their footprints on the sands of time.

3.3 Survived Arabic Terms in the Modern Science

Abubakre (2003:33) provides us with a list of some Arabic terms whichstill survive in the modern day science so as to proof beyond anyreasonable doubt that science owes a lot to the early Muslimsscholarship. The terms include:

S/N ARABIC MODERN SCIENTIFICUSE

ASTRONOMY

1. *An-Nazir* Nazir
2. *As-Samt* Zenith
3. *Al-Faras* Alfaras
4. *At-Tair* Altair

5. *Al-Qaid* Alkaid

6. *Al-khur* Algol

7. *Banatu ’n-Na’sh* Benatnatnasch

8. *Al-yad* Alioth

9. *As-Sadr* Alshedir

10. *Baffu’l-khadib* Caph

11. *Nayru’l-fakkah* Alphecca

12. *Dhanabu’d-Dajajah* Aaneb

13. *As-Sumut* Azimuth

BOTANY, CHEMISTRY AND MEDICINE

14. *Al-Imbig* Alembic

15 *Al-Khul* Alcohol

16. *Al-Gali* Alkali

17. *Ithmid* Antimony

18. *Al-‘Uthal* Aludel

19. *Al-Tutiya’* Tutty

20. *Al-Iksir* Elixir

21. *Julab* Julep

22. *Rubb* Rob

23. *Sharab* Syrup

24. *Sudac* Soda/ Sodanum

25. *Kafur* Camphor

MATHEMATICS

26. *Jaybg* Sinus

27. *Jadhr asamm* Surb

28. *Shin* X

29. *Al-Jabr* Algebra

30. *Sifr* Cipher/Zero

31. *Al-Jabr wa'l Mugabalah* Algorism/Algerism

SELF-ASSESSMENT EXERCICES

i. Mention the various sciences that are associated with Islam

ii. Account for how Islamic Civilization comes next to the GreekCivilization.

4.0 CONCLUSION

From the foregoing, efforts have been geared towards unraveling theunprecedented role of Islam in placing science on a crucial orbit. It isevidently clear that after the Greek civilization comes next the Islamiccivilization, for the challenges thrown by the *Qur'ān* as well as itsencouragement of scientific experiment and researches had led toscientific advancement. Thus, Muslim scientists were able to make theirown contributions to scientific progress world over.

5.0 SUMMARY

The above treatise does not only elucidate on the scientific achievementsof variousscholars in Islambut also shed light on the branches of scienceor culture enhanced by Muslim scientist.

6.0 TUTOR-MARKED ASSIGNMENTS

Identify three major sciences associated with Islam and wite an essay onthe pioneers.

7.0 REFERENCES/FURTHER READINGS

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UNIT 3: SCIENTISTS’ COMMENTS ON SCIENTIFIC HINTS IN THE QUR’ĀN.

CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Contents
Some of the Scientists and their Comments
4.0 Conclusion
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1.0 INTRODUCTION

In this concluding Unit of this Course we reproduce the following comments of scientists on the scientific miracles in the Holy Qur’ān. All of these comments have been taken from the videotape entitled *This is the Truth*. In this videotape, you can see and hear the scientists while they are giving the following comments.

2.0 OBJECTIVES

At the end of this Unit you should be able to:

- Enumerate seven reputable scientists who has favourable opinions on the scientific miracles in the Quran.
- Highlight commentaries of seven distinguished scientists on the scientific miracles in the Holy Qurān.

3.0 **MAIN CONTENTS :**

Some of the Scientists and their Comments

1) T. V. N. Persazud (PhD) a distinguish Professor and Scientist, prolific author and publisher of science books, recipient of most distinguished prize presented in the field of anatomy in Canada in 1999, when asked about the scientific points in the Quran in which he has some researches, he stated the following:

"The way it was explained to me is that Muhammad was a very ordinary man. He could not read, didn't know [how] to write. In fact, he was an illiterate. And we're talking about twelve [actually about fourteen] hundred years ago. You have someone illiterate making profound pronouncements and statements and that are amazingly accurate about scientific nature. And I personally can't see how this could be a mere chance. There are too many accuracies and, like Dr. Moore, I have no difficulty in my mind that this is a divine inspiration or revelation which led him to these statements."

The eminent Professor Persaud has included some Quranic verses and sayings of the Prophet Muhammad ﷺ in some of his books. He has also presented these verses and sayings of the Prophet Muhammad ﷺ at several conferences.

2) Joe Leigh Simpson (PhD), was a Professor of Obstetrics and Gynecology, College of Medicine, Houston, Texas, USA and recipient of many awards, including the Association of Professors of Obstetrics and Gynecology Public Recognition Award in 1992. He studied the following two sayings of the Prophet Muhammad ﷺ extensively.

{**In every one of you, all components of your creation are collected together in your mother's womb by forty days...**}

{**If forty-two nights have passed over the embryo, God sends an angel to it, who shapes it and creates its hearing, vision, skin, flesh, and bones....**}

He noted that the first forty days constitute a clearly distinguishable stage of embryo-genesis. He was particularly impressed by the absolute precision and accuracy of those sayings of the Prophet Muhammad ﷺ. Then, during one conference, he gave the following opinion:

"So that the two *hadeeths* (the sayings of the Prophet Muhammad ﷺ) that have been noted provide us with a specific time table for the main embryological development before forty days. Again, the point has been made, I think, repeatedly by other speakers this morning: these *hadeeths* could not have been obtained on the basis of the scientific knowledge that was available [at] the time of their writing . . . . It follows, I think, that not only there is no conflict between genetics and religion but, in fact, religion can guide science by adding revelation to some of the traditional scientific approaches, that there exist statements in the Qur'ān shown centuries later to be valid, which support knowledge in the Qur'ān having been derived from God."

3) Professor E. M. Johnson, Emeritus Professor of Anatomy and Developmental Biology at Thomas Jefferson University, Philadelphia, Pennsylvania, USA, during the Seventh Medical Conference in Dammam, Saudi Arabia in 1981, summarized his research paper as follows:

"The Qur'ān describes not only the development of external form of Man, but emphasizes also the internal stages, the stages inside the embryo, of its creation and development, emphasizing major events recognized by contemporary science."

Also he said: "As a scientist, I can only deal with things which I can specifically see. I can understand embryology and developmental biology. I can understand the words that are translated to me from the Qur'ān. As I gave the example before, if I were to transpose myself into that era, knowing what I knew today and describing things, I could not describe the things which were described. I see no evidence for the fact to refute the concept that this individual, Muhammad, had to be developing this information from

some place. So I see nothing here in conflict with the concept that divine intervention was involved in what he was able to write."

4) William W. Hay (PhD), a Professor of Geological Sciences at the University of Colorado, USA was another eminent scientist and scholar. After a discussion with him about the Qur'ān's mention of recently discovered facts on seas, he said:

"I find it very interesting that this sort of information is in the Holy Qur'ān, and I have no way of knowing where they would come from, but I think it is extremely interesting that they are there and that this work is going on to discover it, the meaning of some of the passages." And when he was asked about the source of the Quran, he replied: "Well, I would think it must be the divine being."

5) During the Eighth Saudi Medical Conference in Riyadh, Saudi Arabia, Professor Goeringer stated the following in the presentation of his research paper:

"In a relatively few *aayahs* (Quranic verses) is contained a rather comprehensive description of human development from the time of commingling of the gametes through organogenesis. No such distinct and complete record of human development, such as classification, terminology, and description, existed previously. In most, if not all, instances, this description antedates by many centuries the recording of the various stages of human embryonic and fetal development recorded in the traditional scientific literature."

6) Another saying worth mentioning is that of Emeritus Professor Y. Kozai at Tokyo University. He said:

"I am very much impressed by finding true astronomical facts in [the] Qur'ān, and for us the modern astronomers have been studying very small pieces of the universe. We've concentrated our efforts for understanding of [a] very small part. Because by using telescopes, we can see only very few parts [of] the sky without thinking [about the] whole

universe. So, by reading [the] Qur'ān and by answering to the questions, I think I can find my future way for investigation of the universe."

7) Last but not the list, Professor T. Tejasen from Chiang Mai University, Thailand, during the Eighth Saudi Medical Conference in Riyadh, stood up and said:

"During the last three years, I became interested in the Quran . . . . From my study and what I have learned from this conference, I believe that everything that has been recorded in the Qur'ān fourteen hundred years ago must be the truth, that can be proved by the scientific means. Since the Prophet Muhammad could neither read nor write, Muhammad must be a messenger who relayed this truth, which was revealed to him as an enlightenment by the one who is eligible [as the] creator. This creator must be God. Therefore, I think this is the time to say *La ilaha illa Allah*, there is no god to worship except Allah (God), *Muhammadur rasoolu Allah*, Muhammad is Messenger (Prophet) of Allah (God). Lastly, I must congratulate for the excellent and highly successful arrangement for this conference . . . . I have gained not only from the scientific point of view and religious point of view but also the great chance of meeting many well-known scientists and making many new friends among the participants. The most precious thing of all that I have gained by coming to this place is *La ilaha illa Allah, Muhammadur rasoolu Allah*, and to have become a Muslim."

4.0 CONCLUSION

After all these examples we have seen about the scientific miracles in the Holy Qur'ān and all these scientists' comments on this, we can hereby conclude:

- It could not have been a coincidence that all this recently discovered scientific information from different fields was mentioned in the Qur'ān, which was revealed fourteen centuries ago.
- The Qur'ān could not have been authored by Muhammad ﷺ or by any other human being. It must be the literal word of God, revealed by Him.

5. SUMMARY

This Unit presents to you the comments of the following seven distinguished scientists on the scientific miracles in the Holy Qur'ān.

1. T. V. N. Persazud (PhD), University of Manitoba, Canada.
2. Joe Leigh Simpson (PhD), College of Medicine, Houston, USA.
3. E. M. Johnson, Emeritus Professor of Anatomy, Thomas Jefferson University, U.S.A.
4. William W. Hay (PhD), a Professor of Geological Sciences, U.S.A.

1. Professor Goeringer at the Eighth Saudi Medical Conference in Saudi Arabia.
2. Y. Kozai, Emeritus Professor at Tokyo University
3. Professor T. Tejasen, Chiang Mai University, Thailand,

6. TUTOR – MARKED ASSIGNMENT

1. Enumerate seven distinguished scientists whose comments on the scientific miracles in the Holy Qur'ān are presented in this Unit**.**
2. Give the comments of any two of the following distinguished scientists on the scientific miracles in the Holy Qur'ān.
    1. T. V. N. Persazud (PhD), University of Manitoba, Canada.
    2. Joe Leigh Simpson (PhD), College of Medicine, Houston, USA.
    3. E. M. Johnson, Emeritus Professor of Anatomy, Thomas Jefferson University, U.S.A.

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5. Muhammad Iqbal, *Reconstruction of Religious Thought in Islam*, Muhammad Ashraf, Lahore, 1968.

UNIT 4: ISLAM AND WESTERN CIVILIZATION

CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Content
3.1 Definition of West
3.2 Impact of the West in the Muslim Societies.
4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
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1.0 INTRODUCTION

Several attempts have been made by scholars both medieval and contemporary on the impact of Islam on science or simply put, scientific discovery via Islam. Less attention, however, is always accorded the historical antecedents of the earlier Muslim scholars, who made frantic efforts towards discoveries. The question that is germane here is that "Were the West (Europeans) the initiator of the so called civilization? " Koshul (1995) reasoned this way: " It is entirely possible that even though the Europeans made the noted discoveries many centuries after the Muslims, they did so without having any knowledge of earlier Islamic works" Owing to the above, therefore, it is imperative to browse through the impact of Islam on Western Civilization with a view to extricating the unprecedented efforts of these earlier Muslim scholars on the one hand and enomousity of the influence on the European development on the other hand .

2.0 OBJECTIVES

At the end of this unit, you should be able to:

· Enumerate the impact of the Muslim civilization on the Euro- Christian (West) civilization.

3.0 MAIN CONTENT

3.1 Definition of West

Islam according to Lewis (1997) was the first to create a civilisation that was multiracial, multicultural and intercontinental. He sums up this supposition thus: Islam was the first to make significant progress towards what it perceived as its universal mission while western civilization is accorded the first to embrace the whole planet." The west, therefore, as a concept, characterizes the dominant factor, if not the character of the contemporary international relations. The nature of the international system is such that the world is divided between the 'developed' and the 'underdeveloped', the North and the South, the East and the West. In all these, it is the West that dictates this pace. West, therefore, describes the inhabitants of Western Europe and which later metamorphosed to a political term connoting those who share political, economic and cultural view of the Western Europe.

In the same vein, Omotosho quoting Wilfred Smith's *Islam in Modern History*

posits that the term 'West' may signal a religious interest e.g. Christianity, being the predominant faith in the West against the Eastern Europe where for many years religion is officially discourged. Thus, the West sees Christianity as part of its cultural heritage and therefore defends and promotes it along with its political and economic interests.

(Omotosho; 2006:9)

The world of Islam today finds itself in the orbit of the Western domination of the world. But giving its antecedents, Islam is not just like the rest of the world, it had once led the

world, it had conquered parts of the West, it had and continues to convert from Christianity.

Above all, in today's world, the world of Islam has under its soil, a large proportion of the greatest source of energy for industry. Arab oil is an important factor in the advancement of the world economy. And lastly, Islam remains one ideology that is eminently qualified to rival the ideology of the West, the liberal democracy that is the political wing of capitalism. Thus, just like in the past, Islam remains the West's albatross, says Oluwatoki (2006). Having said this, it is apposite to assess the impact of Islam (early Muslims) on Western civilization with a view to discerning the former's indispensability.

3.2 Impact of the Muslim Civilization on the Euro-Christian (West) Civilization

Indeed, it is incomprehensible to the non-Muslims that the Arabs who were so backward and ignorant in the centuries preceding the advent of Islam could have become so enlightened and scholarly in such a short time after adopting the new faith. One of the greatest exponents of this line of thought is Moritz Cantor who has written an encyclopaedic history of mathematics in the German Language. Florian Cajori, the author of the *History of Mathematical Notation* equally says of the Arabs: "The Arabs present an extraordinary spectacle in the history of civilization" (Shariff; 1966: 1277)

The channel of the diffusion of Muslim knowledge to the West has been mainly through the sacking of the Islamic empire in Spain. King Phillip II (1556-1598) seized all books in the libraries of the Spanish Muslim cities. Under Phillip III a ship load of books belonging to Sharif Zaydan, the ruler of Morocco who was shifting his base at the beginning of the Seventeen Century was seized by the Spanish pirates and which eventually were confiscated by the king of the Spaniards.(Abubakre; 2003:31). An objective attitude was alone met with in a quite different sphere, which was only loosely connected with the Islamic religion. I am referring to science in the widest sense of the word. From the very beginning of the tenth century, small groups of men had attempted

to increase the store of theoretical knowledge about the world and man that was contained in the few Latin books that had been salvaged from the wreck of ancient civilization. Men in those few groups had learnt that the Muslims possessed Arabic translations of the basic works of the ancient World, and had access to complete manuals of the sciences that were considered essentials. (Schacht & Bosworth; 1974:.14) Gradually, Latin translations of these works appeared, and the wealth of Arab science spread to England, to Lorraine, to Salerno, and above all to Spain, where contact was more easily made. The work of translation grew and became organized in that country after the fall in 1085 of the great city of Toledo, one of several centres of intellectual activity there.

Indeed, what was being sought in the Arab manuscripts was in no way an image of Islam or of the Muslim world, but rather the objective knowledge of nature. All the same, something inevitable became known about the Muslim provider of this knowledge; and there was also established a close contact with the translators whose services were used, and who were Mozarabs or Jews or in some cases Muslim with a wide first-hand knowledge of the Muslim world.

It is important to note that one Pedro de Alfonso, a Spanish Jew, who was baptized at Huesca in 1106 and became physician to Henry I England translated works on astronomy, and also wrote the first book containing information of some objective value about Muhammad and Islam (*Ibid.* p.15). There was another field where several interest converged, and where the Latins discovered yet another image of Islam which was strikingly at variance with their religious pre-conceptions, that is, philosophy. At first, philosophy and the natural sciences were in need of supplementation from works of what we would call scientific methodology, (works on logic and on theory of Man and Cosmos). The same encyclopedic writers had dealt with all Aristotle and the Avicenna.

The Latin West only gradually became aware of Aristotle. In the twelfth century, his brief *Categories* and his *De Interpretative* were already known through old Latin translations

by Boethius, while the rest of the Aristotelian corpus was slowly becoming known, but only to a handful of people, through new translations made directly from the original Greek. (*Ibid.* p.18).

Briffault, in his "*The Making of Humanity"* did not mince words in linking the European growth to Muslim civilization when he writes: It is highly probable that but for the Arabs modern European civilization would never arisen at all; it is absolutely certain that but for them it would have assumed that character which has enabled it to transcend all previous phases of evolution. For although there is not a single aspect of European growth in which the decisive influence of Islamic culture is not traceable,…(Cited in Koshul; 1995:37).

Okunu (1999) in a paper entitled "Educating the Muslim Child: Triumphs and Problems" quoting same person (Robert Briffault) says further: The influence of the Muslim civilization over Western culture was so great and diverse that it isvisible even today in many of the names of things and articles of ordinary use. The debt of our science to that of the Arabs does not consist in startling discoveries or revolutionary theories, Science owes a great deal more to Arab culture; it owes its existence… What we call science arose in Europe as a result of a new spirit of inquiry, of new methods of investigation, of the method of experiment, observation, and measurement, of the development of mathematics in a form unknown to the Greeks. That spirit and those methods were introduced into European world by the Arabs. (Okunu; 1999)

Human history, according to Sarton's *Introduction to the History of Sciences* published in Baltimore in 1927 could be divided into periodsof fifty years. Each period was identified with the most influentialscientist of the time and named the period as that scientist's epoch. Forinstance, 400-350BC is regarded as the age of Plato (C.347BC),followed by the epochs of Aristotle (C. 322 BC), Euclid andArchimedes etc. From the fifth century BC, Jabir b. Hayyan (d.200AH/815AD Geber in Medieval Europe) was said to be the firstMuslim Scientist to appear between 750-800 periods, followed by

al-Khwarizmi (d.850, Khiva among the West), ar-Razi (d.925, Rhazes),Mas'ud (d.957) Abu al-Wafa' (d.997) al-Biruni (d.1050) and 'Umar al-Khayyam (d.1124). Impliedly, the above MuslimPhilosophers/Scientists appear to be in full control of the world stage of

science for about three hundred and fifty years i.e. three centuries or thereabout (750-1100 CE). This period, he contends, could not be interrupted until 1100CE when Gregory of Cremona and Roger Bacon interrupted the chain. Yet, Muslims reappeared for another two hundred and fifty years i.e. two centuries beginning with the epoch of Ibn Rusd, Nasir ud-Din al-Tusi and Ibn Nafia. Perhaps, this historical chronology informs Sarton's further assertion about Muslim civilization when he says: "The main task of mankind was accomplished by Muslims…" (Elegba; 1993)

The period of Muslim preeminence in the scientific fields parallels directly the Dark Ages in Europe. The wide gap between the westernmand Islamic cultures during this period is better illustrated by these suppositions: al-Hakim (d.975), a vizier in the Muslim government in Spain, had a private library collection of four hundred thousand books while the famous libraryChristian Spain at this time was in the Repoll Monastery, which contained a mere one hundred and ninety-two books. In the same vein, Ibn Fadlan, a Muslim trader observes a crude civilization on the hygienic practices of Scandinavian traders who he had contact with at the lower Volga River in one of his trading tours intothe area. He writes: Every morning a girl comes and brings a tub of water, and places it before her master. In this he proceeds to wash his face and hands, and then his hair, combing it out over the vessel. Thereupon, he blows his nose, and spits into the tub, leaving no dirt behind, conveys it all into this water. When he has finished, the girl carries the tub to the man next him (sic), who does the same. Thus, she continues carrying the tub from one to another, till each of those who are in the house has blown his nose and spit into the tub, and washed his face and hair The point being made in the above explanation is that while the former compares the two private libraries (Hakim and Repoll Monastery) and fathom out which one, probably, is likely to have influenced the other, the latter shows the backwardness of the Scandinavian traders, for as argued by

Koshul, Muslims in Cairo, Baghdad, Toledo, Granada and other major cities were already used to public baths which were constructed by the government and private citizens. In other words, it implies that as at then when the west seems to be barbaric in their waysof life, Muslims were already civilized and advanced.

It is on record that in an attempt to enrich Western philosophy, Gerard of Ceroma made an intellectual tour to Toledo in search of Arabicversions of Greek texts which he would translate. Around the same time, translation of Avicenna's great philosophical compendium (*Kitab al- Shifa'*) had commenced and by 1180, the first corpus of the work wascompleted and began to circulate in Europe.(*Ibid.* p.18 . It is worthy of note also that the Western historian of science's notion inattempting to relegate the Islamic civilization to the role of a meretransmitter of the Greek (Western) tradition aims at denying Islam an important role in the history of science, one that perhaps generated and contributed to modern science in a unique way. The phrase "transmitter of knowledge" according to Fakhr, conveys a passive role, one of translation and preservation; as if by this very statement the element of creativity and innovation within the Islamic community had no existence of its own in the rich evolution of science. He therefore, cautions that the contribution of Islamic civilization towards the plurality of civilizations should not at any point in time be dismissed or forgotten. (Fakhr;1992). Aasi in his paper "Muslim Contributions to the History of Religions" provides us with an insight into the enormous role Muslims played in the history of religions during the Middle Ages. Indeed, al-Shahrastani, according to him was said to be the pioneer scholar to write on the history of religions. In quoting the author of *Comparative Religions: AHistory*, he surmises: The honour of writing the first history of religion, in world literature, seems in fact to belong to the Muslim Shahrastani (d.1153) whose *Religious Parties and Schools ofPhilosophy* describes and systematizes all the religions of the then-known world, as far as the boundaries of China. This outstanding outstrips anything which Christian writers were capable of producing at the same period (Ghulam-Haider; 1991). Frank Rosenthal, the famous translator of some of the medieval works such as Ibn Khaldun's *al-Muqaddimah*

strongly upholds that one of the great contributions of Muslim civilizations to mankind's intellectual progress is the comparative study of religion. (*Ibid.* p.416). What accounted for the backwardness of the Muslims after reaching the zenith according to Aasi might not be unconnected to either due to the onslaught of colonialism or due to the downfall of the Muslim empire; hence, they became more concentrated on the preservation of the tradition and more rigid and defensive, rather than open and analytical in their points of view **(***Ibid.* p.420).

The impact of the Islamic civilization on the European West featured more in the realm of institutions of higher learning. It is on record thatafter the closure of the Academy of Athens by imperial decree in 529, the first institutions of higher learning in Christian Europe were established by the Muslims in the 12th century. Indeed, the first college to be located in the Latin West, known as "College des Dix-Huit" according to Koshul was established in Paris in 1180. The founder, John of London, founded the College when he returned from his Jerusalem tour or visit. Koshul notes in this regard:

Before John of London established this college for "eighteen poor students, the founding of educational institutions for poor students by pious individual had no precedents in Christian Europe. The concept of establishing such charitable trusts is almost certainly based on the Islamic *waqf* system.….The fact that such an institution was first established by an individual who had just returned rom a pilgrimage to Jerusalem in a place where no such institution existed before points strongly to the influence of Islamic civilization in the founding of the first Parisian college. (Koshul; 1995). It has further been posited that the nascent intellectual tradition in the West was deepend and or enhanced by the pocket of individuals who had passed through the Muslim Universities of Spain or Sicily. Prominent among these are Grosseteste who studied in Spain and taught at Oxford, Raymond Lully who studied in Spain and taught at Vienna, Fibionacci who studied mathematics when he was in Algeria and Muslim Spain and returned to Italy, Daniel de Morlay who studied inCordova and taught at Oxford etc. Europe had not one university or cultural centre to show for itself in those centuries when Islamic lands had large

numbers staffed by expertsand specialist in all branches of knowledge. These Islamic centres were beginning to radiate waves of brilliant new thinking to the world at the

very moment when the crusades were launched. In fact, it could be said without any fear of contradiction that it was the new learning fostered by Islam which itself furnished the Europeans with some of their new thinking that made possible whatever powers they achieved in those NONS and fired the passion of jealousy and cupidity which made the

west wish to seize for itself the treasures which they saw Islam bringing to the nations under its sway.

Dr. Gustave says in his book that: "In those days when books and libraries meant nothing to Europeans. Many Islamic lands had books and libraries in plenty. Indeed, in

Baghdad's 'House of wisdom' there were four million volumes, and Cairo's Sultanic library one million, and in the library of Syrian, Tripoli, three million volumes, while in Spain alone under Muslim rule there was an annual publication of between seventy and eighty thousand volumes." (Gustave, n.d. p.329). The indispensability of Arabic language forms another onus of the impact of Muslim civilization on western civilization. Without fear of any contradiction, prior to the 16th century, no scholar of repute in the entire Europe was without a ground knowledge of Arabic, for almost all the classical works in Greek civilization cum the most up-to-date discoveries in various fields, were available only in Arabic. Sarton sums up this indelible position of Arabic language thus: "When the West sufficiently matured to feel the need of deeper knowledge, when it finally wanted to renew its contact with ancient thought, it turned first of all, not to Greek sources, but to the Arabs"

SELF-ASSESSMENT EXERCISES

i. Give a vivid description of Muslim Civilization

ii. Highlight and expatiate on the impact of Muslim Civilization on the Euro-Christian Civilization.

4.0 CONCLUSION

From the foregoing, it is incontrovertible fact that Islam contributed immensely to the Euro-Christian civilization. Perhaps, this account for why Lewis unequivocally submits that Islam was not only the first to create a civilisation that was multiracial, multicultural and intercontinental but also the first to make an indelible advancement towards what it perceived as its universal mission while modern western civilization is the first to embrace the whole planet.These impacts from all indications is all-embracing ranging from intellectual tradition, establishment of higher institutions of learning, history of religions, Arabic language etc.

5.0 SUMMARY

It is obvious from the above treatise that Islam will continue to have its landmark on the Western Civilization, albeit, modern scholars might want to veil this indubitable fact through their pretence and hypocricy.

6.0 TUTOR-MARKED ASSIGNMENTS

1. The impact of the Muslim Civilization on Euro-Christian Civilization is multi-faceted. Discuss.

2. To what extent would you agree or disagree that Westen Civilization would for ever be indebted to the earlier Muslims.

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