

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

الْحَمْدُ لِلَّهِ رَبِّ الْعَالَمِينَ

والصلاة والسلام على خاتم الانبياء والمرسلين

وقل رب زدنى علما

**In the name of Allah the Compassionate,
the Merciful, Praise be to Allah, Lord of the
Universe and Peace and Prayers be upon
His Final Prophet and Messenger.**

**“...and say: My Lord Cause Me to Grow in
Knowledge.”**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

**Islam and Science:
A Study of Major Perspectives**

Thesis

Submitted to the University of Kashmir for the Award of
The Degree of Doctor of Philosophy (Ph. D.)

in

Islamic Studies

By

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Under the Supervision of

Dr. Manzoor Ahmad Bhat
(Supervisor)



**Shah-i-Hamadan Institute of Islamic Studies
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2008**



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the Name of Allah

**SHAH-I-HAMADAN
INSTITUTE OF ISLAMIC STUDIES**

University of Kashmir, Srinagar

CERTIFICATE

This is to certify that this dissertation entitled “**Islam and Science: A Study of Major Perspectives**” is the original work of **Abdul Wasay Bhat**. This work has been carried out under my guidance and supervision. In my opinion it conforms to acceptable standards of scholarly presentation and is adequate in scope and quality, as a dissertation for the degree of **Doctor of Philosophy (Ph.D.) in Islamic Studies**. The work has been submitted for the first time.

Dr. Manzoor Ahmad Bhat
(Supervisor)

DEDICATED

TO MY

LOVING AND CARING

Father and Mother

Who gave me the rudimentary knowledge upon which I could build later. Their devotion to the way of Allah kindled a spark in my heart which has continued to illumine my way.

“My Lord, have mercy upon them as they brought me up when I was small.”
(Al Qur’an 17:24)

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ABBREVATIONS AND DENOMINATIONS

A.H.	After Hijrah
A.S.	عليه اسلام (Upon him be the blessing of Allah)
b.	Date of Birth/Born in or on
C.E.	Christian Era
d.	Date of Death/Died in or on
ed.	Edited/edition/editor
Eng. tr.	English Translation
r	Reign or Period of Rule
R.A.	رضي الله عنه (May Allah be pleased with him)
S.A.W.S	صلى الله عليه وسلم {Prayer (blessings) of Allah and peace (greetings) be upon him (Muhammad, the Prophet and final Messenger of Allah)}
S.W.T.	سبحانه وتعالى May He be praised and may His transcendence be affirmed
Ur. tr.	Urdu Translation

TRANSLITERATION TABLE

The following symbols of transliteration have been used wherever an Arabic or Arabicised word appears.

a. Consonants

ء ا	'	ز	z	ق	q
ب	b	س	s	ك	k
ت	t	ش	sh	ل	l
ث	th	ص	•	م	m
ج	j	ض	ḍ	ن	n
ح	+	ط	•	هـ	h
خ	kh	ظ	ẓ	و	w
د	d	ع	'	ي	y
ذ	dh	غ	gh		
ر	r	ف	f		

b. Vowels:

1. Short Vowels

ا	فتحة	a
و	ضممة	u
ي	كسرة	i

2. Long Vowels

ا	الف ساكنة	ā
و	واو ساكنة	ū
ي	ياء ساكنة	ī

3. Initial Vowels

أ	همزة بالفتح	a
أ	همزة بالضم	u
إ	همزة بالكسر	i

4. Median or Final Vowels

أ	همزة بالفتح	'a
أ	همزة بالضم	'u
إ	همزة بالكسر	'i
ء	همزة ساكنة	'

5. Diphthongs

و	aw/au	ي	ay/ai
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, the Compassionate, the Merciful

INTRODUCTION

Part A – Review of the relevant sources and a brief survey of previous scholarship in the field.

To our knowledge, there exists no work that deals exclusively with the theme of our research problem. However, there is no dearth of literature that deals with various aspects of Islam and science. The holy *Qur'ān*, primarily the Book of Hidāyah, is replete with āyāt that provide broader framework on various natural phenomenon and scientific facts. In a number of Aḥādith-i-Nabwi (S.A.W.S) one can derive sufficient inspiration for scientific enquiry. We shall, here, precisely refer to some prominent works that touch upon directly or indirectly some of the aspects of the problem under investigation in the present work:

1. Muhammad Iqbal Siddiqi and Dr. Mohammad R Mirza, (ed.) *Muslim Contribution to Science*, Ghaziabad UP India, New Era Publishers, 1997.

This book is an excellent compilation of 22 chapters. The author has highlights the lives and works of Muslim scientists and philosophers and stresses upon the Muslims that they should equip themselves with modern sciences in order to achieve a prestigious position in the contemporary world.

2. Maurice Bucaille, *The Bible, the Qur'ān and Science*, tr. by Pannell, Alastair D., Indianapolis, North American Trust Publications, 1978.

The most popular account of the scientific verses of the *Qur'ān*. The author learnt Arabic and studied the *Qur'ān*. In it, he was surprised to find statements on natural phenomena whose meaning, according to the author, can only be understood through modern scientific knowledge.

3. Maurice Bucaille, *Qur'ān and Modern Science*, New Delhi, India, Islamic Book Service, 2000.

This work has been a very effective tool in presenting Islam to non-Muslims as well as introducing Muslims to aspects of the scientific miracle of the Qur'an. It is based on a transcription of a lecture given by Dr. Bucaille in French.

4. Harun Yahya, *The Evolutionary Deceit*, Istanbul, Okur Publishing, 2000.

This book clarifies the scientific collapse of the theory of evolution in a way that is detailed but easy to understand. It reveals the frauds and distortions committed by evolutionists to "prove" evolution. Finally, it analyzes the powers and motives that strive to keep this theory alive and make people believe in it.

5. Sayyid Muhammad Yunus Gilani, *Knowledge an Islamic Weapon*, Rawalpura Srinagar Kashmir, Institute of Islamic Thought, 2002.

This is a study of concept and classification of knowledge in Islam and the concept, classification, appellation, role and responsibilities of scholars, servants, intellectuals, scientists and academicians - '*ulama*'.

6. Isma`il Raji Al-Faruqi, *Islamization of Knowledge: General Principles and Work Plan*, Washington DC, International Institute of Islamic Thought, 1982.

This book gives the main concept behind the establishment of the International Institute of Islamic Thought. This is also an outline of the plan of work for Islamization of knowledge.

7. Muhammad Saud, *Islam and Evolution of Science*, Delhi, Adam Publishers, 1994.

It is a brief comprehensive work. It explains the incentives provided by Islam for the pursuit of science. It deals with the contribution of Muslim scientists to the development of science during the 9th-14th centuries (C.E). Mathematics, Physics, Astronomy, Chemistry, Biology, Agriculture, Geography, Medicine and Technology are among the descriptions discussed.

8. Ziauddin Sardar, *The Future of Muslim Civilization*, London, Mansell Publishing Ltd., 1987.

The World-wide Islamic resurgence has brought to bear a considerable cultural strain on Islamic society. How to evaluate the present condition of Islam in the light of its history? How to accommodate traditional Muslim values with modern technology? How to re-define Islam for the twenty-first century? are some of the questions that examines this book. The author asserts that every Muslim is obligated to work for this reconstruction and he offers detailed operational plans based on historical analysis. He takes a

systems look at the past and the present of Muslim people within a cultural context and by clearly illustrating the available options, develops a methodology for the re-orientation to the path of Islam.

9. Ziauddin Sardar, *Explorations in Islamic Science*. London, Mansell Publishing Ltd., 1989.

This work examines the attitude by which we approach science that makes it secular or Islamic.

10. M.A.K. Lodi, (ed.). *Islamization of Attitudes and Practices in Science and Technology*, Herndon Virginia U.S.A., International Institute of Islamic Thought (IIIT), 1989.

This is a compilation of selected papers presented at the workshop on the Islamization of attitudes and practices in science and technology. The workshop is sponsored by the Association of Muslim Scientists and Engineers (AMSE) and the International Institute of Islamic Thought (IIIT). This book focuses on the problems and challenges of attitudes and practices in science and technology with respect to ideology, personality, education and environment of the Muslim scientists in the contemporary world. The work includes M.A.Lodi's "The Making of a Scientist: The Islamizing of a Muslim Scientist", Sayyid M. Amir's "Science Research in Muslim countries", S.H. Durrani's "Incorporation of Islamic Values in the Administration of a Science Research Institute"; and M. Mazhar Hussaini's "Attitudes and Practices in Food Nutritional Sciences."

11. Khwaja Abdul Waheed, *Islam and The Origins of Modern Science*, Lahore, Islamic Publications, 1978.

This book exposes the falsity of the allegation that Islam is opposed to science and proves that this allegation is a product of ignorance, prejudice and even malice.

12. Abdul Ali, *Arab Islamic Legacy to Life Science*, Delhi, Idarah Adabiyat, 1993.

In this work Abdul Ali assesses the contribution of Arab-Muslim scientists in the field of life sciences.

13. Abdul Ali, and Sayyid Ahsan (ed.). *The Quran and Science*. Muslim University Aligarh India, Institute of Islamic Thought, 2003.

This book contains eleven selected papers presented at a seminar in Aligarh and a summing-up chapter. It focuses on the impact of the *Qur'ān* on the advancement of scientific knowledge.

14. Abu Abdulah Ibn al-Qayim al-Jawziya, *Tibbi Nabawi*. Ur. tr. by Hakim 'Aziz al-Rahman, Bombay, al-Daru al-Salafiah, 1985.

This comprehensive work contains *Abadith* of the Prophet Muhammad (S.A.W.S) regarding health diseases and their cure.

15. Abu Rayhan Al-Biruni, *Kitab al-Jamahir fi Ma`rifat al-Jawahir*. tr. by Hakim Muhammad Said, as *The Most Comprehensive Book on the Knowledge of Precious Stones*, Islamabad, Pakistan Hijrah Council, 1989.

A comprehensive book by one of the most important Muslim scientists, al-Biruni; it integrates his life long scientific learning about precious stones with his religious beliefs.

16. Abu Hamid Muhammad bin Muhammad Al-Ghazali, *Kitab Jawahir al-Qur'ān*, tr. by Muhammad Abdul Quasem, as *The Jewels of the Qur'ān*, London, Kegan Paul International, 1983.

This work contains many ideas about the relationship between the *Qur'ān* and science with examples drawn from the world of nature.

17. Alparslan Açıkgenç, *Islamic Science: Towards a Definition*. Kuala Lumpur, International Institute of Islamic Thought and Civilization, 1996.

It is a theoretical attempt at defining the concept of Islamic science, the work tries to establish the definition by first defining the concept of “Islamic” and then expanding it to “Islamic worldview” and finally to Islamic science.

18. Dr. A. Rahman, *Islam on Science and Technology*, New Delhi India, Adam Publishers and Distributors, 2005.

This book has been written on the basis of many advices given in *al-Qur'ān* and *Abadith* with the aim of bringing awareness among the Muslims, so that some steps could be taken for acquiring knowledge through studies of science and technology. Many verses of the *Qur'ān* are given in this book for the purpose of establishing Islamic views on science and technology.

19. Dr. Zakir Abdul Karim Naik, *The Qur'an and Modern Science Compatible or incompatible*, Mumbai. Islamic Research Foundation (IRF), 2001.

This booklet gives an objective analysis of the Muslim belief regarding the Divine origin of the *Qur'an*, particularly in the light of established scientific discoveries.

20. George Makdisi, *The Rise of Colleges: Institutions of Learning in Islam and the West*. Edinburgh, Edinburgh University Press, 1981.

It is a pioneering work on the Islamic institutions of learning.

21. Ibrahim Abu-Lughod, *Arab Rediscovery of Europe*. Princeton, Princeton University Press, 1963.

This book contains some helpful information about the impact of European science on the Muslim world.

22. Keith Moore, *The Developing Human: With Islamic Additions*. Jeddah, Commission on the Scientific Miracles of the Qur'an and Sunnah, 1982.

This work contains stages of embryonic development of human embryo with Qur'anic references.

23. Lewis Edwin Hahn, Randalle E. Auxier, and Lucian E. Jr. Stone, *The Philosophy of Seyyed Hossein Nasr*. Chicago, Open Court, 2001.

This work deals with all aspects of Nasr's thought and contains a section on his ideas about Islam and science.

24. Muhammad Zaki Kirmani, *The Qur'ān and the Future of Science*, Delhi, Saujanya Books, 2001.

The *Qur'ān* and Future of Science is a serious work based on author's twenty year of reflections on the question as to what a divine book, like the *Qur'ān* which claims to be the guidance for all, in all matters and for all times to come, has to say in the realm of problems that science is facing and posing to man and society in the wake of globalization.

25. Muhammad 'Abduh and Rashid Rida, *Tafsir al-Manar*, Cairo, 1927, 12 vols.

This commentary on the *Qur'ān* contains many “scientific explanations” of the verses.

26. Muzaffar Iqbal, *Islam and Science*. Ashgate, Aldershot, 2002.

A comprehensive work on the relationship between Islam and science.

27. Pervez Hoodbhoy, *Islam and Science: Religious Orthodoxy and the Battle for Rationality*. London and New Jersey, Zed Books Ltd., 1991.

A scathing criticism of the project of justification of *Qur'ān* by science, an angry response to an ill-conceived plan which was being orchestrated by the Commission with the help of a small number of mostly old and retired Muslim scientists and an equally small number of Western scientists who had been lured into the plan by offers of attractive financial rewards and an opportunity to rub shoulders with

the rulers, mercilessly exposed this profanely executed endeavor. But, it is, in itself, equally flawed because of its own agenda which was to support, reiterate and re-establish the “religious orthodoxy versus foreign sciences”. Hoodbhoy finds nothing worthwhile in the Islamic scientific tradition, except “five great ‘heretics’ (al-Kindi, Muhammad ibn Zakariya al-Razi, Ibn Sina, Ibn Rushd and Ibn Khaldun); he accepts the discredited periodization in which Islamic scientific tradition is said to have withered by the thirteenth century C.E., with its so-called “golden age” being in the eleventh century. In his “Why Didn’t the Scientific Revolution Happen in Islam?” (chapter 11), he reproduces a caricature of the arguments used by Orientalists: the role of Muslim law, autonomous institutions, political factors, especially the 1258 sacking of Baghdad, and, of course, al-Ghazali, who “routed the rationalists”.

28. S. Bashir ud-Din Mahmood, *Doomsday and Life after Death*. Islamabad, Holy Qur’an Research Foundation, 1991.

This work explains the Qur’anic themes of Resurrection and life after death through scientific discoveries.

29. Shaikh Abdul Mabud, *Theory of Evolution: An Assessment from the Islamic Point of View*. Kuala Lumpur, The Islamic Academy of Science, 1991.

This is the most detailed scientific treatment of the theory of evolution from an Islamic point of view.

30. Nasr, Sayyid Hussein. *An Introduction to Islamic Cosmological Doctrines*. Cambridge, Belknap Press of Harvard University Press, 1964, repr. Albany, State University Press of New York 1993.

This work is one of the first major modern works dealing with the cosmological doctrines of Ibn Sina, al-Biruni and the Ikhwan al-Saffa’.

31. Sayyid Waqar Ahmad Husaini, *Islamic Science and Public Policies: Lessons from History of Science*. Aligarh India, CSOS, 1988.

Gives an interpretative history of the birth, development and world supremacy of Islamic science and technology. The author is highly critical of Muslims for their “blind imitation” of merely the institutional and infrastructural systems of Western and Eastern science and technology.

32. Sayyid Waqar Ahmad Husaini, *Teaching Islamic Sciences and Engineering*. Michigan USA, New era Publications, 1985.

Presents the goals, structures and functions of the major elements in higher technical education.

33. Sayyid Waqar Ahmad Husani, *Islamic Sciences*. New Delhi, Good Word Books, 2002

This book is an introduction to certain Islamic “sciences” (Ideology): epistemology, education, jurisprudence, ethics and law, politics, economics, philosophy and history of science, and sociology of culture and development.

34. Sayyid Muhammad Naquib Al-Attas, *The Concept of Education in Islam*. Kuala Lumpur, International Institute of Islamic Thought and Civilization, 1991.

A framework for an Islamic philosophy of education. A book of definitions related to essential elements in the concept of education and educational processes as envisaged in Islam.

35. Shams Pirzada, *Dawatul Qur'an*. Eng. tr. by Abdul Karim Shaikh, Bombay India, Idara Dawatul Qur'an, 1991, 3 Vols.

This is a good commentary on the Qur'an with many scientific explanations. In the matters of Fiqh (Islamic jurisprudence) author has not followed any particular school of Fiqh, but has accepted the point which appeared to be more acceptable according to the Qur'an and Sunnah.

36. Toby E. Huff, *The Rise of Early Modern Science: Islam, China and the West*, Cambridge, University of Cambridge, 1993.

Identifies the following causes for the withering of the Islamic scientific tradition: The failure to develop universalism; The failure to develop autonomous corporate bodies; the persistence of particularism in institutions of higher learning; Elitism versus communalism; and Disinterestedness and organized skepticism. A very detailed but flawed study of the Islamic scientific tradition in the tradition of Ignaz Goldzahir.

37. Ahmad Yusuf al-Hassan, *Islamic Technology – An Illustrated History*, UNESCO, 1986.

The author claims that the story of Islamic technology, inspite of its fascination is far from complete. Research in this area is still at an early stage and notwithstanding what has been published so far. Contributions by Islam to science yielded outstanding results. The field of alchemy and chemical technology is a case in point. The introduction of this work places Islamic science and technology in its cultural and historical context, relating it to the heritage from Greek science and to the rise of Islam and Arabic language.

In working out the details of our project we had to exploit the scattered references in various sources. Often the silence of sources about some vital aspects of our theme made us to employ hairsplitting efforts to reach the possible conclusions.

Part B – Present Work

Allāh, the Blessed and Most High, created man for His *'ibadah* without ascribing any partner unto Him.¹ He blessed his *'abd* (man) with intellect, wisdom and power of discernment. Allah sent his messengers from time to time for the guidance of the mankind. He revealed His knowledge to them, which was preserved later in the form of *sabifas* and the books, to be practiced and communicated to the rest of the mankind. Thus the mankind was guided about lawful and unlawful, right and wrong and meritorious and non meritorious acts. The guidelines infact are an embodiment of the way of life based on the will of Allah (S.W.T) that leads to

¹ *Al-Qur'an*, 51:56.

the overall welfare and prosperity of all the humanbeings in this world and in the Hereafter. The mission of the Messengers initiated with prophet 'adam (A.S.) and reached to its finality and perfection with the coming of prophet Muhammad (S.A.W.S). Holy *Qur'ān*, the last book was revealed to prophet Muhammad (S.A.W.S), over a period of 23 years in different phases, as the final book of overall guidance to the mankind for all times to come. Besides other aspects, the *Qur'ān* encompasses a comprehensive, all embracing, all inclusive and all exhaustive proofs for the complete understanding of nature and natural processes. It also promotes an inherent yearning and a universal craving for scientific scrutiny and inquisition. It incites an on-spot study of nature on one hand and stimulates a person's soul to be inquisitive on the other hand. It constantly reflects upon the laws of nature that operate in this universe and which lie within the domain of comprehension of every human being. The *Qur'ān* guides:

أَفَلَا يَنْظُرُونَ إِلَى الْإِبِلِ كَيْفَ خُلِقَتْ ۖ وَإِلَى السَّمَاءِ كَيْفَ رُفِعَتْ ۖ وَإِلَى الْجِبَالِ كَيْفَ
 نُصِبَتْ ۖ وَإِلَى الْأَرْضِ كَيْفَ سُطِحَتْ ۖ (سورة الغاشية)

“Do they not look at the camels – how they are created? And at the sky – how it is raised high? And at the mountains – how they are fixed firm? And at the earth – how it is spread out?”²

إِنَّ فِي خَلْقِ السَّمَاوَاتِ وَالْأَرْضِ وَاخْتِلَافِ اللَّيْلِ وَالنَّهَارِ لآيَاتٍ لِّأُولِي الْأَبْصَارِ ۖ
 (سورة آل عمران)

² *Ibid.*, 88:17-20.

“Undoubtedly in the creation of the heavens and the earth and in the alternation of night and day, there are signs for men of understanding”.³

وَفِي الْأَرْضِ آيَاتٌ لِّلْمُوقِنِينَ ﴿٣٠﴾ وَفِي أَنفُسِكُمْ أَفَلَا تُبْصِرُونَ ﴿٣١﴾ (سورة الذاريات)

“And in the earth are great signs for those who would be convinced. And also in yourselves. Don’t you see?”⁴

وَسَخَّرَ لَكُمُ اللَّيْلَ وَالنَّهَارَ وَالشَّمْسَ وَالْقَمَرَ وَالنُّجُومَ مُسَخَّرَاتٌ بِأَمْرِهِ إِنَّ فِي ذَلِكَ لآيَاتٍ

لِقَوْمٍ يَعْقِلُونَ ﴿٣٢﴾ (سورة النحل)

“And for you He has subjected the night and the day and the sun and the moon to be of service, and the stars are also subjected in service by His command. Verily, herein are signs for the people who have sense”.⁵

It is this scientific temper and quest for knowledge which the verses of *Qur’ān* inspired among the Muslims which now in turn has become the basis of all sciences. There is no denying the fact that Muslims were the upholders of scientific and technological advancement for more than a millennium. Curiously and incidentally that was the age of ignorance and darkness in the history of the west. Prolific importance has been accorded to the scientific investigation in Islam. Muslim contribution to the today’s scientific progress is inherent and quite evident. Muslim scholars of the past deserve a special mention as they not only searched and compiled out the scientific knowledge but also added new dimensions to it while

³ *Ibid.*, 3:190.

⁴ *Ibid.*, 51:20-21.

⁵ *Ibid.*, 16:12.

generally adhering to the rules and regulations laid down by the Islam. The history of Islamic culture puts forward a galaxy of resplendent and dazzling scientists who worked day in and day out and enunciated laws and theories which took the world by surprise. To name a few we have Jabir bin Hayyan, Ibn Al-Haytham, Al-Biruni and the list is unending. These persons plunged deep in to the ocean of knowledge and brought back with them some of the lusturous and splendid pearls which in turn wrapped the world by their radiance. They made the basic infrastructure available which was simply modified by Europe to achieve its present scientific glory. This fact can be verified by a retrospective glance at history.

Dynamic change is the keynote of our time. We apparently stand at the threshold of momentous crises in the world as the mankind marches towards a new paradigm. Such crucial periods are of supreme importance, because their outcome may determine man's course for many generations – perhaps for centuries. Challenge spells struggle. This is certainly true of today. The outstanding feature of modern life is the vast flood of new scientific knowledge with strange blowing winds perplexed by new problems.

Islam, of course, never forgets at any time or place, the nature of man and the limits of his capacities, nor does it neglect the material realities of his existence. It contends that the spiritual and material spheres of life are closely interdependent and if one of the two is neglected the whole object of life will be doomed. In fact Islam

stands for a holistic approach. The past legacy of the Muslims and the contribution towards the development of sciences and giving it a proper direction is the prime fulcrum of present proposed research work: *Islam and Science – A study of Major Perspectives*.

The spirit of Islam is so broad that it embraces the whole span of life practically. It assimilates all the attainable ideas of surrounding people (without violating the spirit of *shari'ah*) and gives them its own peculiar direction for development. Muslims, throughout the world have started the process of educating value based Islamic Sciences within the worldview of Islam. The place and position of science and scientific attitude under the *Qur'an* and *Hadith* of Prophet Muhammad (S.A.A.S) will be discussed and elaborated in the first chapter of the present study. The *Qur'an* encourages a first hand study of nature by observation and experimentation and produces a universal longing for scientific inquiry.⁶ It is this spirit of logic and reasoning which the *Qur'an* inculcates among Muslims that later got manifested in the form of different sciences; like physical and bio sciences. The contribution of Muslims in the field of science finds an elaboration in the second chapter of this work.

Prominent Muslim scientists, philosophers and scholars have also contributed in this direction. There are various trends and approaches embedded in the Islamic sciences. The contribution of prominent Muslim scientists is given a treatment in the third chapter

⁶Khawaja Abdul Waheed, *Islam and the Origins of Modern Science*, Lahore, 1978, p.8.

of the present work. Muslims have started science based study in their science centers. To study the scientific pursuit prevailing in the Muslim science centers is being given a separate treatment in the fourth chapter of the present work.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, the Compassionate, the Merciful

CHAPTER 1

DIVINE GUIDANCE ON SCIENCE

The *Qur'ān* provides broader guidelines about a number of scientific facts and various phenomena that take place in the universe. One important line of demarcation between the divine guidance about the natural phenomenon and the scientific laws and theories that is to be appreciated is that divine laws, facts and phenomena and values are eternal and infallible while as scientific laws and theories are subject to change, modification and are even contestable. Physical sciences are not infallible and that scientific axioms are not necessarily the last word on the subject. There can be no such thing as an absolute scientific truth. Something that was universally accepted in the past as scientifically correct might not be accepted today in the light of latter day scientific experimentation and discoveries. Similarly, what is acceptable today in the world of science might be disputed and disproved in course of time. This does not, however, mean that no heed should be paid to purely science and scientific research or this does not mean that scientific research should be considered as an exercise in futility. Science is not divine revelation but it may serve as a means for betterment of mankind and may help to develop a better understanding of Allah's creation and its purpose.¹

Science is that systematic knowledge of nature and physical world, which is based on observation, experimentation and measurement. These is the meaning of science accepted and

¹Dr. Mohammad R. Mirza and Muhammad Iqbal Siddiqi (ed.), *Muslim Contribution to Science*, Delhi, New Era Publishers, 1997, p. 2-3.

described by scientists. No other explanation of science is acceptable to them that could lead to explore the scientific knowledge.²

Generally, we find rational arguments in the *Qur'an*, these too on common sense level. The *Qur'an* does not generally favour the attitude of showing by demonstration. However, at two places the importance and significance of experimentation is not only implicit but actual experiment has been set up as described in the Holy text. Once as given in *Al Baqarah*³ a man was kept dead for hundred years in response to his question. During this period his donkey also died, degenerated and decayed and only its bones remained un-decayed. But his water and food were kept preserved. When he breathed again after hundred years, his donkey was given flesh and skin before his eyes. The man thus witnessed one of the attributes of Allah (S.W.T) that He can infuse life in dead bodies according to His Will in an extra ordinary manner. Another event is related to the prophet Ibrahim (A. S.)⁴ who requested Allah to show how the dead ones will regain life. An experiment with four birds was suggested to the prophet but before that he was asked, “if he believe not”. The prophet Ibrahim (A.S.) aptly responded, “of course I believe but it is for a bit of satisfaction of his own understanding”⁵. The conversation

²Abdul Ali and Sayyid Ahsan, *The Quran and Science*, India, The Institute of Islamic Studies Aligarh Muslim University, 2003, p. 6.

³ *Al-Qur'an*, 2:259.

⁴Alayh Al Salam means peace be upon the Prophet Ibrahim..

⁵*Al-Qur'an*, 2:260.

at this occasion points to the fact that Allah (S.W.T) does not like the attitude of making unnecessarily observations and experimentation in the matters of the unseen world. On the other hand, it also becomes explicit that in addition to *Imān*⁶ and '*Aql*⁷ the observation and experimentation is also a significant source of satisfaction. And these are the occasions when man is open to the danger of limiting the domains of knowledge to the material and sensual world. The scientists reject supernatural sources and methods of knowledge and develop a unique methodology for science and limit the concept of the entire world into the narrow confines. The reality thus sometimes skips from their vision because the method which they believe in does not always hold good. Contrary to this, the *Qur'ān* first tells about the reality and then provides evidences of the reality from the very world around man.⁸

The *Qur'ān* clearly looks supporting all positive aspects of scientific method as such it invites to ponder upon, study and try to understand the world and find its secrets, yet it explicitly tells many secrets beforehand. Then it guides the humanity that if man gives sound thought to the world there can be no reasonable ground for

⁶The conviction or certainty that Allah is indeed the one and only God and that Muhammad (Salla Allahu 'Alayhi wa Sallam) is His last prophet.

⁷ Reason or collectively the faculties through which 'ilm (knowledge) is achieved.

⁸Abdul Ali and Sayyid Ahsan, *op.cit.*, p. 10-11.

rejecting the revealed Truth.⁹ Almost all vital aspects of science are mentioned in the *Qur'ān*.

The *Hadith* of the Holy Prophet Muhammad (S.A.W.S) are spread through 200 books and over the years Islamic scholars have tried to collect the *Hadith* exclusively dealing with disease and treatment separately. This has resulted in separate chapter *Kitab Al-tibb*¹⁰ in books on *Hadith*. The Prophet Muhammad (S.A.W.S) has encouraged the spirit of investigation and analysis of facts. A careful examination of *Abadith* of the Prophet Muhammad (S.A.W.S) reveals treasures of information. It can be safely accepted that the Prophet (S.A.W.S) had a tremendous knowledge of the science. Many of the methods used by the Prophet (S.A.W.S) find use in different branches of science of the world, thereby indicating the knowledge of the Prophet (S.A.W.S).

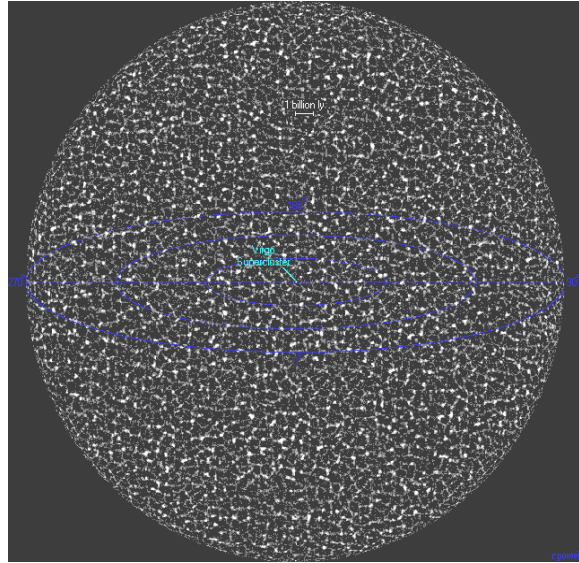
Now let us attempt to explore some important concepts of science under the divine guidance provided by the holy *Qur'ān* and *Abadith* of the Prophet Muhammad (S.A.W.S):

⁹*Ibid.*, p. 12.

¹⁰Kitab Al tib means book of medicine.

2.1 The Universe

The creation of the universe is a subject that is given detailed treatment in the *Qur'ān*. The *Qur'ān* is replete with the verses that provide divine guidance about almost every stage and aspect of the creation and this fact continues to astound scientists today



Map of the known Universe photo NASA because of its very accurate agreement with 21st century knowledge.

All the evidences available today suggest an explosive origin to the universe that brought both space and time into existence. This is what is referred to as the Big Bang.¹¹ The theory of the Big Bang which has successfully taken over the place of the “Steady state theory”¹² was worked out in the 1920's by two scientists quite independently of each other. One was the Russian meteorologist

¹¹Big Bang Theory is currently accepted explanation of the beginning of the universe. The big bang theory proposes that the universe was once extremely compact, dense, and hot. Some original event, a cosmic explosion called the big bang, occurred about 10 billion to 20 billion years ago, and the universe has since been expanding and cooling.

¹²The steady-state theory holds that the universe looks; on the whole, the same at all times and places. The Austrian-British astronomer Hermann Bondi and the Austrian-American astronomer Thomas Gold formulated the theory in 1948.

Alexksandr Friedmann and the other Belgian Mathematician Georges Lemaitre.¹³ The Big Bang itself resulted from an extremely dense singularity. The theory of the creation of the universe is one of matter, space and time that are intimately linked together. Matter and space were joined as one and then were separated in the explosion. This is very accurately described in the *Qur'an*:

أَوَلَمْ يَرَ الَّذِينَ كَفَرُوا أَنَّ السَّمَاوَاتِ وَالْأَرْضَ كَانَتَا رَتْقًا فَفَتَقْنَاهُمَا وَجَعَلْنَا مِنَ الْمَاءِ كُلَّ شَيْءٍ حَيًّا
أَفَلَا يُؤْمِنُونَ ﴿سورة الأنبياء﴾

“Have not the disbelievers pondered that the heavens and the earth were of one piece, then We separated them and that We made of water every living thing? Will they not then believe?”¹⁴

The subsequent history of the Big Bang indicates that the whole event took place at a very high temperature; it was a hot Big Bang. For every phenomenon, however the scientists believe in the cause and effect. In case of Big Bang theory, surprisingly they fail to address the issue of cause responsible for the Big Bang. This leaves a big question mark on their assertion. This view has been confirmed by the later discovery of the background microwave radiation. The eventual formation of galaxies resulted as a condensation, under gravitational pull, of hot gases which was

¹³ *Microsoft Encarta Reference Library*, U.S.A., Microsoft Corp., CD Rom. edition 2003, s.v. “Big Bang theory”

¹⁴ *Al-Qur'an*, 21:30.

mainly Hydrogen, but may also have contained Helium and a few other light elements as well. Over the ages, and with the formation of galaxies, the gas has gradually condensed into individual stars.¹⁵ The universe in its very early stages was, thus, still in the form of hot gases which is mentioned in the Qur'ān in the following verse:

ثُمَّ اسْتَوَىٰ إِلَى السَّمَاءِ وَهِيَ دُخَانٌ ... (سورة فصلت)

“Then He turned to the sky, which was smoke...”¹⁶

Once these stars were formed a system had to be devised to govern their motion. The kinetic energy stored in the forward movement of these bodies could not be relied upon on its own, otherwise stars and also planets would have shot off in straight lines dispersing into space. No planet would ever revolve around its mother star, which also applies to earth and, thus, life would not have evolved on earth, because the whole of life on earth is so dependent on the sun.

The gravity is the brilliant divinely created force, working as an equating factor to the centrifugal force to induce precise orbits for all heavenly bodies. The speed, mass and distance of two bodies

¹⁵ *Microsoft Encarta Reference Library, op.cit.*, s.v. “stars”

¹⁶ *Al-Qur'an*, 41:11. Here the verse did not say clouds or gas, but smoke, which is a very accurate description as smoke is hot gas, whilst clouds are cold.

have to be worked out very precisely to develop the perception of an orbit.¹⁷

A tennis ball thrown upwards towards the sky travels upwards as a result of the kinetic energy stored in the throw but, eventually, the gravity of the earth overcomes it and the ball falls back to the ground. But, the ball thrown at a very high speed (say 10km per second), escapes the gravity of the earth and leaves the earth altogether. This is what is known as the Escape Velocity. It is the speed required for a moving body to enable it to escape the gravity of a planet or star.¹⁸

When an artificial satellite is placed in orbit around the earth, what happens is that at a required distance, while the satellite is shooting out of the earth's gravitational field, its speed is reduced which reduces its kinetic energy and with some directional adjustments its kinetic energy is equated with the earth's gravity.¹⁹ All these adjustments are very precisely executed at a precise distance and speed otherwise it can not find its desired orbit. When one looks at the endless intricate orbits and mathematical precision in the universe one can only gasp in. All the planets revolve around stars, which in turn revolve round the centre of gravity of their own

¹⁷ *The New Encyclopedia Britannica*, Chicago USA, Ency. Britannica Inc., 1992, s.v. "Gravity"

¹⁸ Satish K. Gupta, *Modern's abc of Physics*, Jalandhar, Modern Publishers, 2002, vol.1, p.488.

¹⁹ *Ibid.*, p.467.

galaxies. These very accurate balances are mentioned in the following verses:

الشَّمْسُ وَالْقَمَرُ بِحُسْبَانٍ ﴿٥٥﴾ (سورة الرحمن)

“The sun and the moon are bound by a schedule.”²⁰

وَالسَّمَاءَ رَفَعَهَا وَوَضَعَ الْمِيزَانَ ﴿٥٦﴾ (سورة الرحمن)

He elevated the sky and set up the balance.”²¹

The orbits of the heavenly bodies are mentioned in the verse:

...وَالشَّمْسُ وَالْقَمَرُ كُلٌّ فِي فَلَكٍ يَسْبَحُونَ ﴿٥٧﴾ (سورة الأنبياء)

“...and the sun and the moon, each one²² is floating in (its own) orbit.”²³

In the next stage these massive newly formed stars start to shrink under their own gravitational pull. As a result, their central regions become denser and, thus, hot. When the material in the centre of the star has heated up sufficiently, to be exact, at least seven million degrees Kelvin²⁴, nuclear reactions begin. These

²⁰ *Al-Qur'an*, 55:5

²¹ *Al-Qur'an*, 55:7

²² Here the word "كل" i.e. “each one” indicates that the reference to the sun and the moon is symbolic and it applies to all other heavenly bodies also.

²³ *Al-Qur'an*, 21:33.

²⁴The SI unit of absolute temperature, equal to 1/273.16 of the absolute temperature of the triple point of water, equivalent to one degree Celsius. A temperature in kelvin may be converted to Celsius by subtracting 273.16.

reactions, which are similar to those which take place in a hydrogen bomb, continue throughout the life of the star. These reactions are distinctly different from ordinary combustion (as in burning wood). What actually takes place inside a star is that hydrogen is converted to helium with the emission of huge energy.²⁵ The *Qur'an* precisely refers to it as:

اللَّهُ نُورُ السَّمَاوَاتِ وَالْأَرْضِ مِثْلُ نُورِهِ كَمِشْكَاةٍ فِيهَا مِصْبَاحٌ الْمِصْبَاحُ فِي زُجَاجَةٍ الزُّجَاجَةُ
 كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ زَيْتُونَةٍ لَا شَرْقِيَّةٍ وَلَا غَرْبِيَّةٍ يَكَادُ زَيْتُهَا يُضِيءُ وَلَوْ
 لَمْ تَمْسَسْهُ... (سورة النور)

Allah is the light of the heavens and the earth. The example of His light is as a niche wherein is a lamp. The lamp is in a glass, the glass is as it were a shining star. It is lit from a blessed tree, an olive, neither of the east nor of the west, whose oil would almost glow forth though no fire touched it....²⁶

A part of this verse mentions a star, its fuel, and a reaction which is not combustion (fire) but a sort of “nuclear reactions” the verse is a very accurate description of what goes on inside a star. These nuclear reactions cause the stars to radiate all types of radiation into space, from x-rays and gamma rays in the short waves to the longer radio waves. The visible section of those waves which

²⁵ *Microsoft Encarta Reference Library, op.cit.*, s.v. “How stars produce energy”

²⁶ *Al-Qur'an*, 24:35.

are found between the ultra-violet and the infra-red is what we call sunlight.²⁷

On the other hand, planets do not emit any light of their own, but instead shine by reflected light.²⁸ The *Qur'anic* guidance in this regard runs as follows:

تَبَارَكَ الَّذِي جَعَلَ فِي السَّمَاءِ بُرُوجًا وَجَعَلَ فِيهَا سِرَاجًا وَقَمَرًا مُنِيرًا ﴿سورة الفرقان﴾

“Blessed is He who has placed in the heaven constellations of stars and has placed in it a lamp and a moon enlightening.”²⁹

هُوَ الَّذِي جَعَلَ الشَّمْسَ ضِيَاءً وَالْقَمَرَ نُورًا... ﴿سورة يونس﴾

“It is He who gave the sun his brightness and the moon her light.”³⁰

In 1965, a very important discovery was made, and that was the background radiation which supported the Big Bang theory. But, the Big Bang theory, together with the detection of the red shift in the spectrum of far away galaxies, gave birth to yet a new concept and that was the universe is expanding.

Light is made up of waves, and redshift is a change, caused by the object's motion, in the wavelength of light radiated by an object.

²⁷Microsoft Encarta Reference Library, *op.cit.*, s.v. “light”

²⁸ *Ibid.*, s.v. “planet”

²⁹ *Al-Qur'an*, 25:61.

³⁰ *Ibid.*, 10:5.

Redshifts occur because of a phenomenon scientist's call the Doppler Effect. The Doppler Effect occurs when a wave-emitting object moves toward or away from an observer, and the observer sees or hears the waves differently than he or she would if the object were stationary relative to the observer. If a light-emitting object is moving away from an observer, each wave of light leaves the object from a point slightly farther away from the observer than the previous wave. Therefore, the distance between waves (called the wavelength) that the observer sees is longer than it would be if the object were stationary. Austrian physicist Christian Johann Doppler describes this effect in sound waves in the mid-1800s, and it became known as the Doppler Effect for all types of waves.³¹ When applied to light waves it was found that if the source of light is approaching its light would be shifted towards the blue end of the spectrum, while as light from a receding source would be shifted towards the red end of the spectrum. While analyzing the light we receive from distant galaxies it was found that they all had a red shift meaning that they were flying away from us. That contribution of the red shift analysis meant that the universe is indeed expanding. This finding is literally mentioned in the *Qur'ān*:

وَالسَّمَاءَ بَنَيْنَاهَا بِأَيْدٍ وَإِنَّا لَمُوسِعُونَ ﴿٥١﴾ (سورة الذاريات)

³¹ *Microsoft Encarta Reference Library, op.cit.*, s.v. "Redshift"

“And the sky, We created with might (power) and we are expanding³² it”.³³

During the period of the revelation of the *Qur’ān* (7th century C.E.), it was still believed that all the stars in the sky including our sun were eternal and are made of a material that never fades or decays. No one was really aware of the nature of the reactions that take place inside stars. The Sun cannot shine forever, because it will eventually use up its present fuel. The nuclear fusion reactions that make the Sun glow depend on the element hydrogen, but the hydrogen in the Sun’s core will eventually run out. Nuclear reactions have converted about 37 percent of the hydrogen originally in the Sun’s core into Helium. Astronomers estimate that the Sun’s core will run out of hydrogen in about 7 billion years.

The Sun will grow steadily brighter as time goes on and more quantity of Helium accumulated in its core. Even as the supply of hydrogen dwindles, the Sun’s core must keep producing enough pressure to keep the Sun from collapsing in on itself. The only way it can do this is to increase its temperature. The increase in temperature raises the rate at which nuclear reactions occur and makes the Sun brighter. As such it is presumed that in 3 billion years, the Sun will be

³² Here the word "expanding" is used in the present tense and not in the past which again is in agreement with the fact that the expansion of the universe is a continuous process.

³³ *Al-Qur’an*, 51:47.

hot enough to boil Earth's oceans away. Four billion years thereafter, the Sun will have used up all its hydrogen and will balloon into a giant star that engulfs the planet Mercury. At this point in its life, the Sun will be a red giant star. The Sun will then be 2,000 times brighter than it is now, and hot enough to melt Earth's rocks. At this time the outer solar system will get warmer and more inhabitable. The icy moons of the giant planets may warm enough to be covered by water instead of ice.

It is further presumed that when the giant Sun uses up its fuel, it will no longer be able to support the weight of its inner layers, and they will begin to collapse toward the core, eventually producing a small, dense, cool star called a white dwarf. The Sun will then have about the same radius as Earth has, but it will be much denser and more massive than Earth. The Sun will become a white dwarf star about 8 billion years from now. After it becomes a white dwarf, it will cool slowly for billions of years, eventually becoming so cool that it will no longer emit light.³⁴ Here, the Qur'an uses the very accurate scientific words:

فَإِذَا النُّجُومُ طُمِسَتْ ﴿سورة المرسلات﴾

“Then when stars will fade out”.³⁵

The finite life of stars is also referred to:

³⁴ *Microsoft Encarta Reference Library, op.cit.*, s.v. “The sun's remote past and distant future”

³⁵ *Al-Qur'an*, 77:8.

...وَسَخَّرَ الشَّمْسَ وَالْقَمَرَ كُلًّا يَجْرِي لِأَجَلٍ مُّسَمًّى... (سورة الرعد)

...He has ordained the sun and the moon, each one runs (it's course) for an appointed time...³⁶

Chapter 81 of the *Qur'an* at its outset describes the end of heavenly bodies as follows:

إِذَا الشَّمْسُ كُوِّرَتْ ﴿١﴾ وَإِذَا النُّجُومُ انْكَدَرَتْ ﴿٢﴾ ... وَإِذَا الْبِحَارُ سُجِّرَتْ ﴿٣﴾ (سورة التكوين)

“When the sun will be folded up, and when the stars will lose their luster...and when the oceans will be made to boil”.³⁷

It is very significant to note that verse reveals “When the stars will lose their luster” and not “When the sun will lose its luster”, because the boiling of the oceans will be a result of the expansion of the sun (red giant stage) and not it’s folding or collapse, that is, the ocean will boil over long before the sun starts to fold or collapse. Also, the term “انْكَدَرَتْ” means foldup or collapse”, as used in the *Qur'an*, is the precise term used by today’s astronomers to describe that stage of a star’s life.

Whilst the Big Bang provided an explanation as to the origin of the universe, it still remained necessary to calculate its age. To do so,

³⁶ *Ibid.*, 13:2.

³⁷ *Ibid.*, 81:1, 2, 6.

astronomers once again rely on red shift to calculate the speeds and distance of the farthest galaxies³⁸ and quasars³⁹.

Allah (S.W.T.) has not 'finished' creation; rather, it is an ongoing process. The Qur'an mentions:

...وَيَخْلُقُ مَا لَا تَعْلَمُونَ ﴿سورة النحل﴾

"...and He creates that which you do not know".⁴⁰

...يَخْلُقُ اللَّهُ مَا يَشَاءُ إِنَّ اللَّهَ عَلَىٰ كُلِّ شَيْءٍ قَدِيرٌ ﴿سورة النور﴾

"...Allah creates what He will. Verily Allah has power over all things".⁴¹

This is very significant from a scientific point of view because man is gradually beginning to observe and understand certain natural phenomena which are still in a process of formation. One prime example is our observation of still- emerging galaxies from huge clouds of nebulae. Another is the creation of new species, with its associated evidence of strange and exotic "intermediate" life forms turned into fossils.

³⁸ Galaxy is a group of billions of stars and their planets, gas, and dust that extends over many thousands of light-years and forms a unit within the universe. Held together by gravitational forces, most of the estimated 50 billion galaxies are shaped as spirals and ellipses, with the remainder being asymmetrical.

³⁹ Quasar is a compact object in space, usually with a large red shift indicating extreme remoteness that emits huge amounts of energy, sometimes equal to the energy output of an entire galaxy.

⁴⁰ *Ibid.*, 16:8

⁴¹ *Ibid.*, 24:45

A significant number of scientists and writers have come to realize that the ability of the physical world to organize itself constitutes a fundamental, and deeply mysterious, property of the universe. The fact that nature has creative power, and is able to produce a progressively richer variety of complex forms and structures, challenges the very foundation of contemporary science. The greatest riddle of cosmology, writes Karl Popper, the well-known philosopher, is that “The universe is, in a sense, creative”.⁴²

The orbits of the infinite number of the stars and all the galaxies are the result of immaculately precise balances. These very accurate balances are clear indications of the existence of a supreme governing power that is responsible for creating as well as sustaining the universe. The Qur’ān speaks of these fine balances:

وَالسَّمَاءَ رَفَعَهَا وَوَضَعَ الْمِيزَانَ ﴿٥٥﴾ (سورة الرحمن)

“He elevated the sky and setup the balance”.⁴³

If the moon was closer to the earth, the tides would rise causing gigantic waves that would destroy life on islands and coastal areas. If the moon was further away from the earth the tides would come to a standstill leading to the stagnation of seas, the result of which would be grave damage to marine life. These very precise

⁴² *www.najaco.com*, s.v. “on the ongoing process of creation”

⁴³ *Al-Qur’an*, 55:7

measurements of such variables as distance, mass, speed etc. are referred to in the following verses:

الشَّمْسُ وَالْقَمَرُ بِحُسْبَانٍ (سورة الرحمن)

“The sun and the moon are bound by a schedule”.⁴⁴

The earth spins on its axis once every 24 hours. If it does not spin, the oceans would empty all their waters and if it spins much faster it would disperse into empty space. The spinning movement is also responsible for the night and day, without which one half of the earth would be under continuous sunlight and heat up excessively while the other half would be submerged in total darkness and freeze to death.⁴⁵ The Spinning of the earth is also mentioned in the Qur’ān:

خَلَقَ السَّمَاوَاتِ وَالْأَرْضَ بِالْحَقِّ يَكُونُ اللَّيْلَ عَلَى النَّهَارِ وَيَكُونُ النَّهَارَ عَلَى اللَّيْلِ وَسَخَّرَ
الشَّمْسَ وَالْقَمَرَ كُلٌّ يَجْرِي لِأَجَلٍ مُّسَمًّى أَلَا هُوَ الْعَزِيزُ الْغَفَّارُ ﴿٥٠﴾ (سورة الزمر)

He has created the heavens and the earth with truth. He makes night to succeed day and He makes day to succeed night, and He made the sun and the moon obedient, each running for an appointed term. Lo! He is the Mighty, the Forgiver.⁴⁶

⁴⁴ *Ibid.*, 55:5

⁴⁵ *Microsoft Encarta Reference Library, op.cit.*, s.v. “moon”

⁴⁶ *Al-Qur’an*, 39:5

Today we know that the Earth is oval shaped, bulging at the equator. Fourteen centuries ago it was believed that the earth is flat. It was not known then that the earth is round oval. The *Qur'an* again states that the earth is oval:

وَالْأَرْضَ بَعْدَ ذَلِكَ دَحَاهَا ﴿٣٠﴾ (سورة النازعات)

“And after that He spread the earth [like a dahiya].⁴⁷

The word “*dahiya*” in Arabic means an egg, hence the oval shape. But the verse also includes a further remarkably accurate scientific fact. The words ‘after that’ clearly indicate that the earth acquired the oval shape at a later stage after its formation. Modern science will testify that the bulging of the earth at the equator is a result of the continuous spinning of the earth on its axis, and thus had to occur sometime after the formation of the earth. The earth spins on its axis at a speed of one thousand kilometers per hour. The earth rotates round the sun once every 365.25 days. Whilst doing so it is tilted on its axis at an angle of 33 degrees. As a result, the seasons occur making it possible for the habitation on the planet. If the earth was not tilted on its axis the poles would have been submerged in continuous cold darkness preventing the seasonal thaw of the polar ice. The accumulating ice would

⁴⁷ *Ibid.*, 79:30

eventually result in non shifting frozen poles and little water elsewhere.⁴⁸

The rotation of the earth around the sun was not known in the 7th century C.E. At that time it was still believed of the earth as a non moving planet at the centre of the universe. Due to the apparent movement of the sun, moon and stars in the sky, it was assumed that they are moving around the earth. The movement of the earth in space is confirmed in the following verse:

وَتَرَى الْجِبَالَ تَحْسَبُهَا جَامِدَةً وَهِيَ تَمُرُّ مَرَّ السَّحَابِ صُنِعَ اللَّهُ الَّذِي أَتَقَنَ كُلَّ شَيْءٍ إِنَّهُ خَبِيرٌ بِمَا تَفْعَلُونَ ﴿سورة النمل﴾

“And you see the mountains, you think they are firm, (but) they will be flying like clouds: the doing of Allah who has perfected all things. Verily He is aware of what you do”.⁴⁹

Since the earth is moving in space thus everything on earth is moving with it, including the mountains. If the earth’s crust had been thicker than its present thickness all the oxygen would have been absorbed into the earth. Without oxygen no life would be possible. Similarly, if the oceans were much deeper, all the oxygen and carbon dioxide would have been absorbed into the oceans with similar results. All these precise specifications are referred to in the following verse:

⁴⁸ *Microsoft Encarta Reference Library, loc.cit.*

⁴⁹ *Al-Qur’an, 27:88*

وَهُوَ الَّذِي خَلَقَ السَّمَاوَاتِ وَالْأَرْضَ بِالْحَقِّ ... (سورة الأنعام)

“It is He who created the heavens and the earth in truth (with a purpose)...”⁵⁰

2.2 The atom

The *Qur'an* provides guidance with regard to the formation of elements. About one of the elements created in the earth it speaks:

...وَأَنْزَلْنَا الْحَدِيدَ فِيهِ بَأْسٌ شَدِيدٌ... (سورة الحديد)

“...and [He] sent down iron wherein is mighty fright...”⁵¹

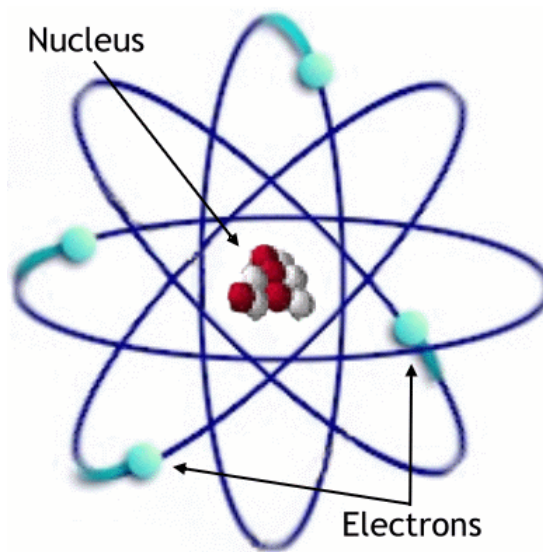
‘Mighty fright’ (*بَأْسٌ شَدِيدٌ*) means it contains that power which was necessary for war purposes. The sword, canon, the tank and other armaments are made of iron, which frighten the enemy and break their backs. Similarly this power can also be used to punish the guilty. Moreover, iron is also a thing of common usefulness as it is used on a large scale in various industries.⁵²

⁵⁰ *Ibid.*, 6:73

⁵¹ *Ibid.*, 57:25

⁵² Shams Pirzada, *Dawatul Qur'an*, Eng. Tr. by Abdul Karim Shaikh, Bombay, Idara Dawatul Qur'an, 1992, vol 3, p.1963.

The formation of the elements poses further intriguing questions. The atoms of elements are comprised of a nucleus orbited by a number of electrons. The nucleus contains a number of protons, which are positively



Composition of an atom

charged, and a number of neutrons which are neutral in charge.⁵³ But since like charges repel each other while opposites attract we might expect the nucleus to split apart with every proton trying to get away from every other proton. What is it then that holds them together? Gravity, due to the mass of the protons and neutrons, is certainly insufficient. It is believed that there is a strong binding force many thousand times stronger than the gravity.⁵⁴

The scientists believed for a long time that atoms were the smallest components of matter. They were of the opinion that there would be nothing found within the atom. They all held the view that an atom could not be divided. However Joseph John Thomson (1856-1940C.E.) demonstrated by a series of experiments in the laboratory came to the conclusion that there were particles within

⁵³ P.L. Soni, *Text book of Inorganic Chemistry*, New Delhi, Sultan Chand & Sons, 1991, p. 1.11-1.15.

⁵⁴ B.S.Bahl and G.D.Tuli, *Essentials of Physical Chemistry*, 21st ed., New Delhi, S.Chand and Company Ltd, 1992, p.95.

the atom that carried a negative electrical charge. He called them electrons. He was also able to discover the weight of these particles and found out that they weighed 1/20,000 parts of the hydrogen atom, the lightest element known to man.⁵⁵

Working from Newzealand, Ernest Rutherford (1871-1937C.E.) was also interested in the study of the nature of electrons. He wanted to see if he could find anything else within the atom. Hans Wilhelm Geiger (1882-1945C.E.) who discovered the Geiger counter, worked with him on this study. They decided that the best way to learn what was within the atom was to blow it apart. They decided to shoot the atom with a particle in the laboratory having a strong positive electrical charge. They called this as alpha particle.⁵⁶

Finally, in the year 1911C.E. after a series of experiments in the laboratory, Rutherford concluded that the atom consists of a very small, heavy center, called the nucleus. Far away within the shell of the atom were the electrons, each one of them orbiting at high speeds around the nucleus.⁵⁷ Although Rutherford now had a fair idea of what the atoms looked like. However, many questions remained to be answered. What was the nucleus made of? What balanced the negative electric charge of the electrons? He performed another set of experiments and concluded the nucleus was positively

⁵⁵ *Microsoft Encarta Reference Library, op.cit.*, s.v. "Electron"

⁵⁶ *Ibid.*, s.v. "Geiger, Hans Wilhelm"

⁵⁷ *Ibid.*, s.v. "Rutherford"

charged. He called these positive charged particles as protons. Now he had a complete picture of the atom.

At the same time, there were other scientists, who were trying to discover the composition of the Nucleus. Following his discovery of the proton in 1919, Rutherford suggested that a third particle, in addition to the proton and the electron, existed inside the atom. In 1932C.E. British physicist James Chadwick (1891- 1974C.E.) measured the energy of the protons emerging from the hydrogen atoms and showed that they had been knocked out by a particle of about the same mass, but electrically neutral. This new particle was therefore named the neutron. It was also found that protons and neutrons moved in a circle at different levels within the nucleus of an atom, just as electrons travel in circles outside the nucleus. With the discovery of neutrons in the year 1932C.E. the idea about the composition of atom was comprehended in a better way.⁵⁸

Nevertheless, new discoveries led scientists to suggest that there was further scope to study the composition of atom. Thus, in the 4th decade of 20th century a new branch of physics emerged which exclusively dealt with the science of elementary particles. This led to the idea that some particles also behaved as wave of energy without any mass. It was later discovered that these elementary particles were not elementary; and some particles acted not only as

⁵⁸ *Ibid.*, s.v. "Neutron"

particles, but also as waves of energy without any mass. The first particle found was an electron with a positive charge. Carl D. Anderson (1905-1991C.E.) discovered it in the year 1932. It was called as a positron. He found that some atoms struck by certain rays sent out a particle exactly like the electron, except for a positive electric charge. It had not been noticed before for its total life is one-billionth of a second.⁵⁹

In 1935, Hideki Yukawa (1907-1981C.E.) of Kyoto, University of Japan, said that there should be another particle in the nucleus of the atom. He called this particle the meson. He said that the meson was the energy bond that held together the particles within the nucleus. Carl Anderson also found out the meson working in his laboratory. Later on, it was found that there are two types of mesons-the *pi* meson and the *mu* meson and that the former was denser than the later.⁶⁰

Earlier in 1931, an Austrian-born Swiss physicist and Nobel laureate named Wolfgang Pauli (1900-1958C.E.) had formulated that there was another particle having no mass that was being sent out from some elements. It was able to get rid of its energy during

⁵⁹ *Ibid.*, s.v. "Positron"

⁶⁰ *Ibid.*, s.v. "meson"

radioactivity. In 1956, these observations led to the discovery of neutrinos.⁶¹

When a positron and an electron hit each other, both disappear, and energy is sent out. It is for this reason that the positron is also called as an anti-electron, meaning an opposing electron. This led to the belief that perhaps there is an antiparticle for each of the particles of the atom. At present, this belief has been proved correct. A total of more than 30 particles and antiparticles have been found within the atom and thus is in line with the information contained in the *Qur'ān*. These sub-atomic particles are also mentioned in the *Qur'ān*:

... لَا يَعْزُبُ عَنْهُ مِثْقَالُ ذَرَّةٍ فِي السَّمَاوَاتِ وَلَا فِي الْأَرْضِ وَلَا أَصْغَرَ مِنْ ذَلِكَ وَلَا أَكْبَرَ إِلَّا فِي كِتَابٍ مُبِينٍ □ (سورة سبأ)

“... Not an atom’s weight or less than that or greater escapes Him in the heavens or in the earth, but it is in a clear book”.⁶²

This Qur’ānic verse clearly indicates that the atom is not the smallest form of substance but that there are particles smaller than the atom. This might seem common knowledge today but it was not so in the 7th century.

⁶¹ *Ibid.*, s.v. “neutrino”

⁶² *Al-Qur’an*, 34:3

2.3 Atmosphere



Earth's atmosphere seen from space photo NASA

The atmosphere acts as a protective shield that absorbs harmful radiations. The sun, like any other star, radiates at a wide range of wavelengths. The visible waves, which we call sunlight, are only a portion of that radiation, and that light lies between the ultra-violet and the infra-red rays. The sun also radiates at wave lengths longer than what the human eye can see and that is in the infra-red and the radio wave regions, and also in wave lengths shorter than we can see in the ultra-violet, X-ray and Gamma Ray regions. These short waves (X-ray and Gamma rays) are completely blocked off in the upper layers of the earth's atmosphere. While most of the ultra-violet rays

are absorbed in the ozone layer only a small amount of ultra-violet rays can penetrate, and these are the rays that cause us sunburn, and in excess, are said to cause skin cancer. The ozone⁶³ layer lies at about 50 kilometers above the earth's surface and works as a natural shield to protect us from harmful sun rays. ⁶⁴

The Qur'ān asserts this function:

وَجَعَلْنَا السَّمَاءَ سَقْفًا مَّحْفُوظًا وَهُمْ عَنْ آيَاتِهَا مُعْرِضُونَ ﴿سورة الأنبياء﴾

“And We have made the sky [Samā]⁶⁵ a roof safe. Yet they turn away from its signs”.⁶⁶

حَتَّىٰ إِذَا بَلَغَ مَطْلِعَ الشَّمْسِ وَجَدَهَا تَطْلُعُ عَلَىٰ قَوْمٍ لَّمْ نَجْعَلْ لَهُم مِّن دُونِهَا سِتْرًا ﴿سورة الكهف﴾

“Till, when he reached the rising place of the sun, he found it rising on a people for whom We had appointed no shelter from it [the sun].⁶⁷

⁶³Ozone is a form of oxygen.

⁶⁴ Philip Matthews, *Advanced Chemistry*, Cambridge University press, 1992, p.630-631.

⁶⁵ The words "Samā" and "Samawāt" are used in the Quran in different meanings. The word "Samawāt" (skies), which is the plural of "Samā" (sky), is always used to denote the heavens or the universe as a whole. The word "Samā" is usually used to denote our immediate sky or the earth's atmosphere. As an example of the two uses, we read: "God created the 'samawāt' (heavens) and the earth, truthfully. This provides a sufficient proof for the believers." 29:44 Here the word "samawāt" (plural) means heavens or universes. "He (God) sends down from the 'samā' (sky) water for your drink, and to grow trees for your benefit." 16:10 Here the word "samā" (singular) is used to mean our immediate sky.

⁶⁶ *Al-Qur'an*, 21:32

⁶⁷ *Ibid.*, 18:90

The verse indicates the presence of a people, and thus areas, that are not shielded. This is in line with the current knowledge concerning the existence of holes in the ozone layer. It is generally thought that these holes have always existed. The matter has suddenly acquired an alarming nature because the size of these holes is greatly being enlarged as a result of man's pollution of the planet.

Another scientific knowledge that was referred to the *Qur'an* centuries before man's actual discovery of it relates to the composition of the atmosphere. It is now known that the higher we ascend in the sky the less air we would find, and thus the less oxygen so vital for respiration. A person flying at great heights in aircraft or air balloon would feel a sharp contraction of the lungs causing pain⁶⁸.

فَمَنْ يُرِدِ اللَّهُ أَنْ يَهْدِيَهُ يَشْرَحْ صَدْرَهُ لِلْإِسْلَامِ وَمَنْ يُرِدْ أَنْ يُضِلَّهُ يَجْعَلْ صَدْرَهُ ضَيِّقًا حَرَجًا كَأَنَّمَا يَصْعَعُدُ فِي السَّمَاءِ ... (سورة الأنعام)

“Whom Allah wills to guide, He opens his breast to Islam; and whom He wills to mislead, He makes his breast small and narrow as if he is climbing sky-high...”⁶⁹

The atmosphere acts as a medium for the movement of clouds to supply rain to all the corners of the globe and maintain all types of vegetation.

⁶⁸ M.B.V. Roberts, *Biology A Functional Approach*, 4th ed., Hong Kong, Nelson, 1994, p. 247.

⁶⁹ *Al-Qur'an*, 6:125

أَلَمْ تَرَ أَنَّ اللَّهَ يُرْجِي سَحَابًا ثُمَّ يُؤَلِّفُ بَيْنَهُ ثُمَّ يَجْعَلُهُ رُكَّامًا فَتَتَرَى الْوَدْقَ يَخْرُجُ مِنْ خِلَالِهِ
وَيُنزَلُ مِنَ السَّمَاءِ... (سورة النور)

Do you not see that Allah drives the clouds, then gather them, then piles them in layers? Then you see rain coming out from between them...⁷⁰

وَاللَّهُ الَّذِي أَرْسَلَ الرِّيحَ فَتُثِيرُ سَحَابًا فَسُقْنَاَهُ إِلَى بَلَدٍ مَيِّتٍ فَأَحْيَيْنَا بِهِ الْأَرْضَ بَعْدَ مَوْتِهَا
كَذَلِكَ النُّشُورُ (سورة فاطر)

And it is Allah who sends the winds and they raise the clouds; then We lead them to a dead land and revive therewith the earth after its death. Such is the Resurrection.⁷¹

2.4 Oceans and seas



Ocean



Sea

⁷⁰ *Ibid.*, 24:43

⁷¹ *Ibid.*, 35:9

The contracting nebula caused the earth to be very hot in the initial stages. As it slowly began to cool the heavier elements like iron fell to the centre whilst the lighter compounds like granite and oxides surfaced at the top. The cooling continued and a thin crust formed. The layer immediately beneath the crust eventually started to solidify giving rises and depressions above it leading to the formation of mountains and valleys. When the surface cooled further, to below 100 degrees centigrade (100°C), liquid water (which before then was still trapped inside the earth) began to form and fill the depressions that are now the oceans and seas.⁷² The knowledge that all the water was once trapped inside the earth and then was drawn out is mentioned in the *Qur'an*:

أَخْرَجَ مِنْهَا مَاءَهَا وَمَرْعَاهَا ﴿سورة النازعات﴾

“And [He] produced there from its [the earth] water and pasture”.⁷³

An interesting geographical fact, relating to high and low land on earth, is mentioned in the following verse:

غُلِبَتِ الرُّومُ ﴿ فِي أَدْنَى الْأَرْضِ ... ﴾ (سورة الروم)

“The Romans have been defeated in the nearby territory [in the lowest of the lands]...”⁷⁴

⁷² Microsoft Encarta Reference Library, *op.cit.*, s.v. “Age and origin of the earth”

⁷³ *Al-Qur'an*, 79:31

⁷⁴ *Ibid.*, 30:2-3

It is now known that the area near the Dead Sea, which was the scene of these battles, is the lowest spot on earth below sea level.⁷⁵

There are innumerable things such as different minerals, petrol etc. on the sea bed and below the sea bed. For using these oceanic resources and also for harnessing ocean in proper ways, man must study to know qualities of ocean water, ocean bed and its geographical or geological structures, different minerals available, their distribution etc. and man must find out or make devices or ways and means for using these resources. Gratefulness to Allah (S.W.T.) will also be associated along with the use of Allah's bounties available in the oceans. In this regard Allah says:

وَهُوَ الَّذِي سَخَّرَ الْبَحْرَ... (سورة النحل)

“And He it is who has subjected the sea to be of service...”⁷⁶

Again in another verse Allah guides:

اللَّهُ الَّذِي سَخَّرَ لَكُمْ الْبَحْرَ لِنَجْرِي الْفُلْكَ فِيهِ بِأَمْرِهِ وَلِتَبْتَغُوا مِنْ فَضْلِهِ وَلَعَلَّكُمْ تَشْكُرُونَ (سورة الجاثية)

“It is Allah who has subdued the ocean to you so that ships may sail on it at His bidding, so that you may seek His bounty and render thanks to Him.”⁷⁷

⁷⁵ Microsoft Encarta Reference Library, *op.cit.*, s.v. “Dead Sea”

⁷⁶ *Al-Qur'an*, 16:14

⁷⁷ *Ibid.*, 45:12

In this way after getting indication or information of bounties of Allah in the sea and instruction to harness them, no believers (*Mumin*) can stay away from study of sea and get benefit from it. In this modern age of science, a subject viz “Oceanography” has thus been opened in many universities. For the profession of sailing on the sea i.e. for becoming a navy and also to learn techniques of harnessing oceanic resources “Marine Engineering” are taught in many institutions.⁷⁸

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.⁷⁹ 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 hill, 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.⁸⁰ Although there are large waves, strong currents, and tides in these seas, they do not mix or transgress this barrier. The *Qur’ān* mentions that there is a barrier between two seas that meet and that they do not transgress. Allah (S.W.T.) prescribes:

⁷⁸ Dr. A. Rahman, *Islam on Science and Technology*, New Delhi, Adam Publishers, 2005, p.50.51

⁷⁹ Dr. Zakir Abdul Karim Naik, *The Qur’an and Modern Science Compatible or Incompatible?*, Mumbai, Islamic Research Foundation (IRF), 2001, p.27. Also see Davis, *Principles of Oceanography*, p. 92-93.

⁸⁰ *Idem*

مَرَجَ الْبَحْرَيْنِ يَلْتَقِيَانِ ۚ بَيْنَهُمَا بَرْزَخٌ لَّا يَبْغِيَانِ ۚ (سورة الرحمن)

“He released two seas so that they meet. Between them is a barrier which they cross not.”⁸¹

But when the *Qur'an* speaks about the divider between fresh and salt water, it mentions the existence of “a forbidding partition” with the barrier. Allah (S.W.T.) says in the *Qur'an*:

وَهُوَ الَّذِي مَرَجَ الْبَحْرَيْنِ هَذَا عَذْبٌ فُرَاتٌ وَهَذَا مِلْحٌ أُجَاجٌ وَجَعَلَ بَيْنَهُمَا بَرْزَخاً وَحِجْراً مُّحْجُوراً ۚ

(سورة الفرقان)

“It is He who had caused the two seas (river and sea) to meet; one palatable, sweet, and the other saltish, bitter; and has set a barrier between them, an insurmountable obstruction.”⁸²

One may ask, why does the *Qur'an* mention the partition while speaking about the divider between fresh and salt water, but does not mention it while speaking about the divider between the two seas? Modern science has discovered that in estuaries⁸³, 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

⁸¹ *Al-Qur'an*, 55:19-20.

⁸² *Ibid.*, 25:53.

⁸³ Estuary is the wide lower course of a river where the tide flows in, causing fresh and salt water to mix.

two layers.”⁸⁴ This partition (zone of separation) has a different salinity from the fresh water and from the salt water.⁸⁵

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).

⁸⁴Dr. Zakir Abdul Karim Naik, *op.cit.*, p.29. Also see *Introductory Oceanography* by Thurman, pp. 300-301.

⁸⁵*Idem*

2.5 Clouds



Clouds

Scientists have studied various types of cloud and have realized that rain clouds are formed and shaped according to a peculiar pattern and certain steps connected with certain types of wind and clouds. One kind of rain cloud is the cumulonimbus cloud associated with thunderstorms. Meteorologists⁸⁶ have studied how cumulonimbus clouds are formed and how they produce rain, hail, and lightning. They have found that cumulonimbus cloud go through the following steps to produce rain:

⁸⁶ A meteorologist is a person who studies the atmosphere.

1. The clouds are pushed by the wind: Cumulonimbus clouds begin to form when wind pushes some small pieces of clouds (cumulus) to an area where these clouds converge.
2. Joining: Then the small clouds join together forming a larger and denser cloud.
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. These updrafts cause the cloud body to grow vertically, so the cloud is stacked up. 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.⁸⁷

Allah (S.W.T.) affirms in the *Qur'ān*:

أَلَمْ تَرَ أَنَّ اللَّهَ يُزْجِي سَحَابًا ثُمَّ يُؤَلِّفُ بَيْنَهُ ثُمَّ يَجْعَلُهُ رُكَّامًا فَتَرَى الْوَدْقَ يَخْرُجُ مِنْ خِلَالِهِ
وَيُنزِلُ مِنَ السَّمَاءِ مِنْ جِبَالٍ فِيهَا مِنْ بَرَدٍ فَيُصِيبُ بِهِ مَنْ يَشَاءُ وَيَصْرِفُهُ عَنِ مَنْ يَشَاءُ
يَكَادُ سَنَا بَرْقِهِ يَذْهَبُ بِالْأَبْصَارِ ﴿سورة النور﴾

Do you not see that Allah drives the clouds, then gather them, then piles them in layers? Then you seen rain coming out from between

⁸⁷ www.it-is-truth.org

them; He sends down hail from the heavens, from the mountains which are therein, and smites with it whom He will and turn it away from whom He pleases. The flash of the lightning almost snatches away the sight.⁸⁸

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 the like to study winds and its direction, to measure humidity and its variations, and to determine the levels and variations of atmospheric pressure.

Meteorologists have found that these cumulonimbus clouds, that shower hail, reach a height of 25,000 to 30,000 feet (4.7 to 5.7 miles), like mountains, as the *Qur'an* mentions: And He sends down hail from mountains (clouds) in the sky...⁸⁹ Actually clouds become electrified as hail falls through a region in the cloud of super cooled droplets and ice crystals. As liquid droplets collide with hail, they freeze on contact and release latent heat⁹⁰. This keeps the surface of the hail warmer than that of the surrounding ice crystals.⁹¹

When the hail comes in contact with an ice crystal, an important phenomenon occurs. Electrons flow from the colder object toward the warmer object. Hence, the hail becomes negatively charged. The same effect occurs when super cooled droplets come in contact with a

⁸⁸ *Al-Qur'an*, 24:43

⁸⁹ *Idem*

⁹⁰ Latent heat is the amount of heat absorbed or released by a substance sufficient to produce a change of phase.

⁹¹ www.it-is-truth.org

piece of hail 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, fall toward the bottom of the cloud, thus the lower part of the cloud becomes negatively charged. These negative charges are then discharged to the ground as lightening. We conclude from this that hail is the major factor in producing lightening. This information on lightening was discovered only recently.

2.6 Deep Seas and Internal Waves

Allah (S.W.T.) asserts in the *Qur'ān*:



Deep Sea and Internal Wave

أَوْ كَظُلُمَاتٍ فِي بَحْرٍ لُجِّيٍّ يَغْشَاهُ مَوْجٌ مِّنْ فَوْقِهِ مَوْجٌ مِّنْ فَوْقِهِ سَحَابٌ ظُلُمَاتٌ بَعْضُهَا
فَوْقَ بَعْضٍ إِذَا أَخْرَجَ يَدَهُ لَمْ يَكِدْ يَرَاهَا... ﴿١٠١﴾ (سورة النور)

Or (the unbelievers' state) like darkness on a vast, bottomless sea, there covers him a wave, above which is a wave, above which is a cloud. Layer upon layer of darkness. If he stretches out his hand, he can not see it...⁹²

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. At this depth, there is almost no light. Below a depth of 1000 meters there is no light at all.⁹³ 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.

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. This can very clearly understood from the text of the above quoted verse, "...on a vast, bottomless sea, there covers him a wave, above which is a wave, above which is a cloud...", 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 human eye 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

⁹² *Al-Qur'an*, 24:40.

⁹³ Dr. Zakir Abdul Karim Naik, *op.cit.*, p.31.

of different densities.”⁹⁴ 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 behave, 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.⁹⁵

2.7 Mountains



Mountains

The mountains that were formed, as the earth’s crust cooled, play a major role (as modern geological theories indicate). They contribute to affixing the continents in place. These continents are

⁹⁴*Microsoft Encarta Reference Library, op.cit.*, s.v. “deep sea”

⁹⁵*Idem*

virtually floating on melted layers that lie beneath. In general, the thickness of the earth's crust is about five kilometers. However, the thickness directly beneath mountains extends up to thirty five kilometers.⁹⁶ That is because beneath every mountain lies a reversed shaped mountain root below the surface. These reversed mountains do the job of pegs in affixing the land. This is very accurately stated in the *Qur'an*:

أَلَمْ نَجْعَلِ الْأَرْضَ مِهَادًا ۝ وَالْجِبَالَ أَوْتَادًا ۝ (سورة النبيا)

“Have We not made the earth as floor? And the mountains as pegs?”⁹⁷

As the earth does not rest on any support, it seems inevitable that the earth should be balanced on all sides to ensure its smooth functioning and security against earthquake. The mountains and hills are so placed on the northern hemisphere to balance the oceans on the southern.⁹⁸ The *Qur'an* pronounces:

خَلَقَ السَّمَاوَاتِ بِغَيْرِ عَمَدٍ تَرَوْنَهَا وَأَلْقَى فِي الْأَرْضِ رَوَاسِيَ أَنْ تَمِيدَ بِكُمْ ۝ (سورة لقمان)

He created the heavens without pillars as you see it, and set into the earth mountains so that it may not shake with you...⁹⁹

وَالْأَرْضَ مَدَدْنَاهَا وَأَلْقَيْنَا فِيهَا رَوَاسِيَ وَأَنْبَتْنَا فِيهَا مِنْ كُلِّ شَيْءٍ مَّوْزُونٍ (سورة الحجر)

⁹⁶ Dr. Zakir Abdul Karim Naik, *op.cit.*, p.26.

⁹⁷ *Al-Qur'an*, 78:6-7

⁹⁸ Dr. Mohammad R. Mirza and Muhammad Iqbal Siddiqi, *op. cit.*, p. 85, 86.

⁹⁹ *Al-Qur'an*, 31:10

And we spread out the earth, and placed therein mountains and caused to grow therein everything in due proportions.¹⁰⁰

وَيَسْأَلُونَكَ عَنِ الْجِبَالِ فَقُلْ يَنْسِفُهَا رَبِّي نَسْفًا ۖ فَيَذَرُهَا قَاعًا صَفْصَفًا ۖ لَا تَرَى فِيهَا عِوَجًا
وَلَا أَمْتًا ۗ (سورة طه)

They ask you about the mountains. Say: “My Lord will crush them into scattered dust, “And leave it (the earth) as a level plain, “Wherein you will see neither curve nor ruggedness”.¹⁰¹

2.8 Geology



Planet Earth

Geology is the study of the planet earth, its rocky exterior, its history, and the processes that act upon it. Geology is also referred to

¹⁰⁰ *Al-Qur'an*, 15:19

¹⁰¹ *Ibid.*, 20:105-107

as earth science and geoscience. The word geology comes from the Greek *geo*, “earth,” and *logia*, “the study of.” Geologists seek to understand how the earth formed and evolved into what it is today, as well as what made the earth capable of supporting life. Geologists study the changes that the earth has undergone during its 4.5 billion year history.¹⁰²

Allah (S.W.T.) at a number of places in the *Qur’an* directs the attention of human beings towards the geological science as:

وَأَيَّةٌ لَهُمُ الْأَرْضُ الْمَيِّتَةُ أَحْيَيْنَاهَا وَأَخْرَجْنَا مِنْهَا حَبًّا فَمِنْهُ يُأْكُلُونَ ﴿سورة يس﴾

The dead earth is a big sign to them. We gave it life, and from it brought forth grain so that they eat thereof.¹⁰³

أَوَلَمْ يَرَوْا إِلَى الْأَرْضِ كَيْفَ أَنْبَتْنَا فِيهَا مِنْ كُلِّ زَوْجٍ كَرِيمٍ ﴿سورة الشعراء﴾

Have they not seen the earth, how much of every beneficial kind We made to grow therein:¹⁰⁴

هُوَ الَّذِي جَعَلَ لَكُمْ الْأَرْضَ ذُلُولًا فَأَمْشُوا فِي مَنَاكِبِهَا وَكُلُوا مِنْ رِزْقِهِ وَإِلَيْهِ النُّشُورُ ﴿سورة

الملك﴾

It is He Who has made the earth subservient to you. So walk over its shoulders and eat of His provisions, to Him is the resurrection.¹⁰⁵

وَإِلَى الْجِبَالِ كَيْفَ نُصِبَتْ ﴿سورة الغاشية﴾

¹⁰² Microsoft Encarta Reference Library, *op.cit.*, s.v. “Geology”

¹⁰³ *Al-Qur’an*, 36:33

¹⁰⁴ *Ibid.*, 26:7

¹⁰⁵ *Ibid.*, 67:15

[Do they not look] and at the mountains – how they are fixed firm? And at the earth – how it is spread out?¹⁰⁶

هُوَ الَّذِي خَلَقَ لَكُمْ مَّا فِي الْأَرْضِ جَمِيعًا... ﴿سورة البقرة﴾

It is He Who has created for you all things which are on earth...¹⁰⁷

Studies of earth's surface and rocks have enabled scientists to know the time of formation of the earth (age of the earth), its process of differentiation and different materials or compositions of the surface. It enables man to use different minerals found on and below the surface of the earth.¹⁰⁸

¹⁰⁶ *Ibid.*, 88:19-20

¹⁰⁷ *Ibid.*, 2:29

¹⁰⁸ Dr. A. Rahman, *op.cit.*, p 47.

2.9 Agriculture and climate



Agriculture



Climate

There is intimate relation between climates of a place and its agriculture. Wind and the atmospheric condition control the formation of clouds along with their movements and cause rain.

Proper rainfall converts a dead land into a living, fertile and beautiful land bearing a rich harvest.¹⁰⁹ Allah (S.W.T.) guides in this regard:

وَهُوَ الَّذِي يُرْسِلُ الرِّيَّاحَ بُشْرَىٰ بَيْنَ يَدَيْ رَحْمَتِهِ حَتَّىٰ إِذَا أَقْلَّتْ سَحَابًا ثِقَالًا سُقْنَاهُ لِبَلَدٍ مَّيِّتٍ فَأَنْزَلْنَا بِهِ الْمَاءَ فَأَخْرَجْنَا بِهِ مِنْ كُلِّ الثَّمَرَاتِ ... (سورة الأعراف)

It is He who sends forth the winds as harbingers of His mercy. Then, when they bear a heavy cloud, We drive it to a dead land, then cause water to descend thereon, and thereby bring forth fruits of every kind...¹¹⁰

For a good harvest, only rain is not sufficient, quality of land must be good i.e. land must be fertile. Allah has indicated this in the following verse:

وَالْبَلَدُ الطَّيِّبُ يَخْرُجُ نَبَاتُهُ بِإِذْنِ رَبِّهِ وَالَّذِي خَبُثَ لَا يَخْرُجُ إِلَّا نَكِدًا كَذَلِكَ نُصَرِّفُ الْآيَاتِ لِقَوْمٍ يَشْكُرُونَ (سورة الأعراف)

From the good land, (rich) produce springs forth, by the will of its Lord, and from that which is vile, springs forth nothing but poor produce. Thus do We explain our signs differently to those who are grateful.¹¹¹

Thus there is necessity to study and research on climate and quality of land for good agricultural products. Detailed knowledge of climatic condition enables a cultivator to know pressure, temperature,

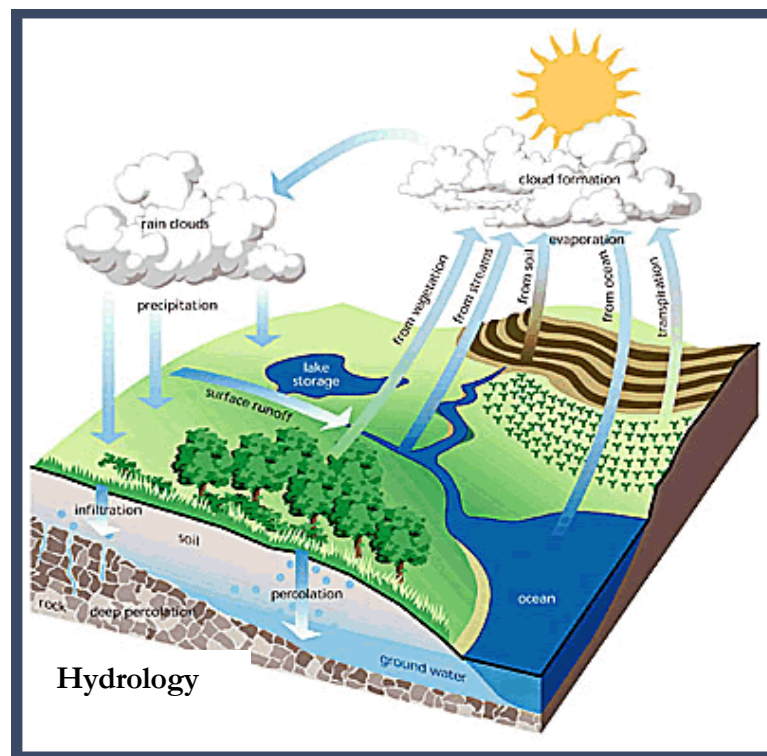
¹⁰⁹ *Ibid.*, p 53.

¹¹⁰ *Al-Qur'an*, 7:57.

¹¹¹ *Ibid.*, 7:58.

wind condition and probable rainfall of any place. On the other hand the awareness about the fertility, moisture conditions, ground water, and mineral contents of the soil enables the cultivator to decide about the cultivation of a specific crop. Acquaintance with the climatic conditions and quality of a particular land helps the cultivators to take the appropriate decisions for the cultivation of the most suitable crop that could yield best results.¹¹²

2.10 Hydrology and Hydrography



Hydrology is the science that deals with the waters of Earth—their properties, behaviour, and distribution. Hydrography is the

¹¹² Dr. A. Rahman, *op.cit.*, p 54.

scientific study of seas, lakes, and rivers, especially the charting of tides and changes in coastal bathymetry or the measurement and recording of river flow.¹¹³ In both the sciences water study is imperative. Water is the major constituent of living matter. From 50 to 90 percent of the weight of living organisms is water. Protoplasm, the basic material of living cells, consists of a solution in water of fats, carbohydrates, proteins, salts, and similar chemicals. Water acts as a solvent, transporting, combining, and chemically breaking down these substances. Blood in animals and sap in plants consists largely of water and serve to transport food and remove waste material. Water also plays a key role in the metabolic breakdown of such essential molecules as proteins and carbohydrates. This process, called hydrolysis, goes on continuously in living cells.¹¹⁴ In this regard Allah (S.W.T.) the Creator of all things proclaims:

...وَجَعَلْنَا مِنَ الْمَاءِ كُلَّ شَيْءٍ حَيٍّ أَفَلَا يُؤْمِنُونَ ﴿سورة الأنبياء﴾

...We made of water every living thing? Will they not then believe?¹¹⁵

وَاللَّهُ خَلَقَ كُلَّ دَابَّةٍ مِّن مَّاءٍ فَمِنْهُمْ مَّن يَمْشِي عَلَى بَطْنِهِ وَمِنْهُمْ مَّن يَمْشِي عَلَى رِجْلَيْنِ وَمِنْهُمْ مَّن يَمْشِي عَلَى أَرْبَعٍ يَخْلُقُ اللَّهُ مَا يَشَاءُ إِنَّ اللَّهَ عَلَىٰ كُلِّ شَيْءٍ قَدِيرٌ ﴿سورة النور﴾

¹¹³Microsoft Encarta Dictionary, U.S.A., Microsoft Corporation, CD Rom edition 2003, s.v. "Hydrology and Hydrography"

¹¹⁴Microsoft Encarta Reference Library, op.cit., s.v. "water in life"

¹¹⁵ Al-Qur'an, 21:30

And Allah has created every animal from water. Of them, one (kind) creeps on its belly, and one (kind) walks on two legs, and one (kind) walks upon four. Allah creates what He will. Verily Allah has power over all things.¹¹⁶

وَهُوَ الَّذِي خَلَقَ مِنَ الْمَاءِ بَشَرًا... (سورة الفرقان)

And it is He Who has created man from water...¹¹⁷

For the sustenance of various lives on earth Allah has arranged distribution of water throughout the world. So that all may receive its support according to their respective needs.

...وَأَنْزَلْنَا مِنَ السَّمَاءِ مَاءً طَهُورًا ﴿١٠١﴾ لِنُحْيِيَ بِهِ بَلْدَةً مَّيْتًا وَنُسْقِيَهُ مِمَّا خَلَقْنَا أَنْعَامًا وَأَنَاسِيَّ كَثِيرًا

﴿١٠٢﴾ وَلَقَدْ صَرَّفْنَا هَٰؤُلَاءِ بَيْنَهُمْ... (سورة الفرقان)

....And We send down purifying water from the sky, so that We may give life to the dead land, and provide drink for many cattle and people, that We have created. And verily We set it forth clearly among them...¹¹⁸

About 75 percent of the earth's surface is covered by water. This means that water is predominant on our globe. Without water no living thing can survive. Such an important thing deserves studies, so that this unparallel bounty of Allah (S.W.T.) could be realized and also could further be used by man for diverse purposes. Regarding water, Allah (S.W.T.) further says:

أَفَرَأَيْتُمُ الْمَاءَ الَّذِي تَشْرَبُونَ ﴿١٠٣﴾ (سورة الواقعة)

¹¹⁶ *Ibid.*, 24:45

¹¹⁷ *Ibid.*, 25:54

¹¹⁸ *Ibid.*, 25:48-50

“Have you thought over the water you drink?”¹¹⁹

The above verse implies that man should study and research on the nature, composition and utility of water and glorify Allah (S.W.T.) for bestowing it with diverse qualities. In this regard, there are points of reflection in the following verse:

أَلَمْ تَرَ أَنَّ اللَّهَ أَنْزَلَ مِنَ السَّمَاءِ مَاءً فَسَلَكَهُ يَنَابِيعَ فِي الْأَرْضِ ثُمَّ يُخْرِجُ بِهِ زَرْعاً مُّخْتَلِفاً أَلْوَانُهُ ثُمَّ
يَهَيِّجُ فَتْرَاهُ مُّصْفَرّاً ثُمَّ يَجْعَلُهُ حُطَاماً إِنَّ فِي ذَلِكَ لَذِكْرَى لِأُولِي الْأَبْصَارِ ﴿سورة الزمر﴾

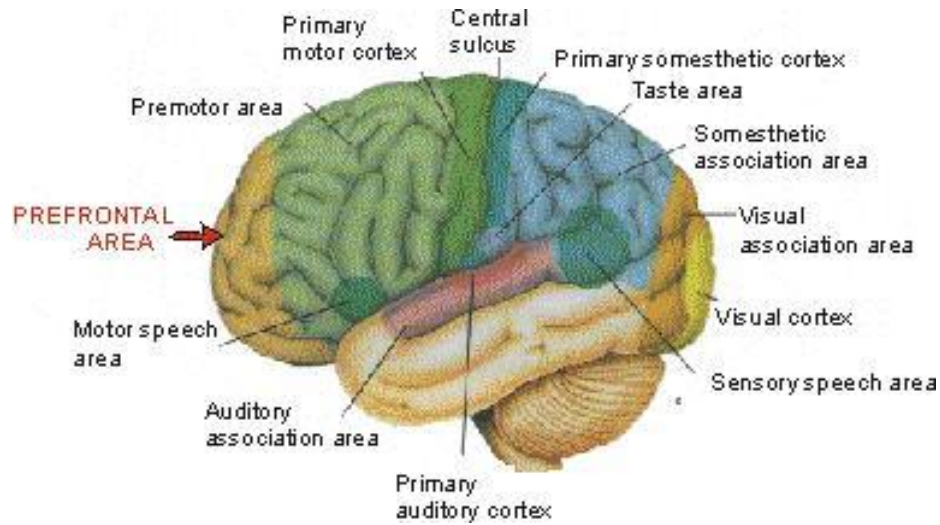
Do you not see that Allah sends down water from the sky and causes it to penetrate and gather in spring beneath? He brings forth plants of many colours. Then they wither, and you see them turn yellow, then He makes them chaff. Verily, herein is a reminder for men of understanding.¹²⁰

There are a few other verses in the *Qur'an* about water. Nowadays, knowledge about water has been substantially increased because of scientific studies and truth has been established regarding its universal essentiality in life formation, sustenance and survival processes. There has been extensive studies on diverse qualities of water, chemical characteristics etc., and techniques have been evolved for drinking pure water, supplying water for agricultural purposes, for generating electricity and for using it in many other ways.

¹¹⁹ *Ibid.*, 56:68

¹²⁰ *Ibid.*, 39:21

2.12 CEREBRUM



Cerebrum

In the *Qur'an* almighty Allah cites the case of one of the unbelievers who forbade the Prophet Muhammad (S.W.T.) from praying at the Ka'abah:

كَلَّا لَئِن لَّمْ يَنْتَهِ لَنَنْفَعَنَّ بِالنَّاصِيَةِ ۖ نَاصِيَةٍ كَاذِبَةٍ خَاطِئَةٍ ﴿سورة العلق﴾

“Beware! If he desists not, We will drag him by the forelock [front of the head]. A lying, sinful forelock.”¹²¹

The Arabic word *Nasiyha* means forelock. If we look into the skull at the front of the head, we will find the prefrontal area of the cerebrum. What does physiology tell us about the function of this area? A book entitled, “*Essentials of Anatomy and Physiology*”, says:

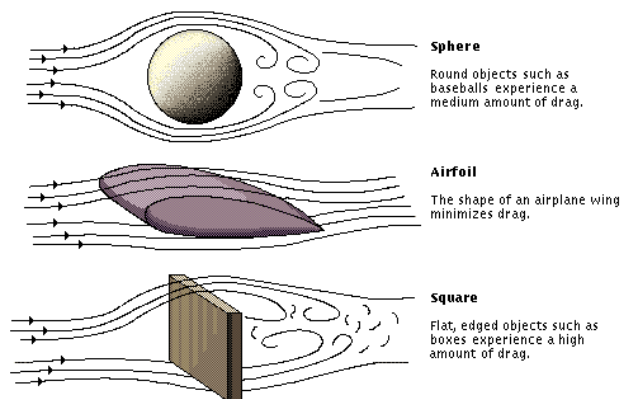
¹²¹ *Ibid*, 96:15-16

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 the association cortex...In relation to its involvement in motivation; prefrontal area is also thought to be the functional center for aggression...¹²²

So, this area of the cerebrum is responsible for planning, motivating, and initiating good and sinful behaviour, and is responsible for telling lies and speaking the 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 *Qur'an* points out: ...a lying, sinful *Nasiyah* (front of the head). Scientists, according to Professor Keith Moore, discovered these functions of the prefrontal area just sixty years back.

2.12 Aerodynamics

In this modern age “Aerodynamics” has been a major subject of science for study. Detailed knowledge of the atmosphere, air motion, its pressure,



Aerodynamics

temperature, density and their variations is necessary for design and manufacture of modern means of communication, means of defence

¹²² Sssley and others, *Essentials of Anatomy and Physiology*, Elaine .N. Marieb, 2002, p.211.

and offence, aircrafts, satellites, ships, missiles and rockets. Knowledge of atmosphere is also necessary to utilize all these in the best possible way and monitor their motions through atmosphere.

In other fields of our daily activities air or atmosphere is also used extensively. Thus from olden days air is being used for sailing purposes. Air driven machines are also being used nowadays for generating electricity. But most important of air is that it is most essential for life due to the presence of oxygen in it.¹²³ Regarding air Allah (S.W.T.) says in the *Qur'an*:

وَمِنْ آيَاتِهِ أَنْ يُرْسِلَ الرِّيَّاحَ مُبَشِّرَاتٍ وَلِيُذِيقَكُمْ مِنْ رَحْمَتِهِ وَلِتَجْرِيَ الْفُلُكُ بِأَمْرِهِ وَلِتَبْتَغُوا مِنْ فَضْلِهِ وَلَعَلَّكُمْ تَشْكُرُونَ ﴿سورة الروم﴾

And of His signs is that He sends the winds as bearers of good tidings, so that you may taste of His mercy, and ships may sail at His command, so that you may seek His bounty and render thanks to Him.¹²⁴

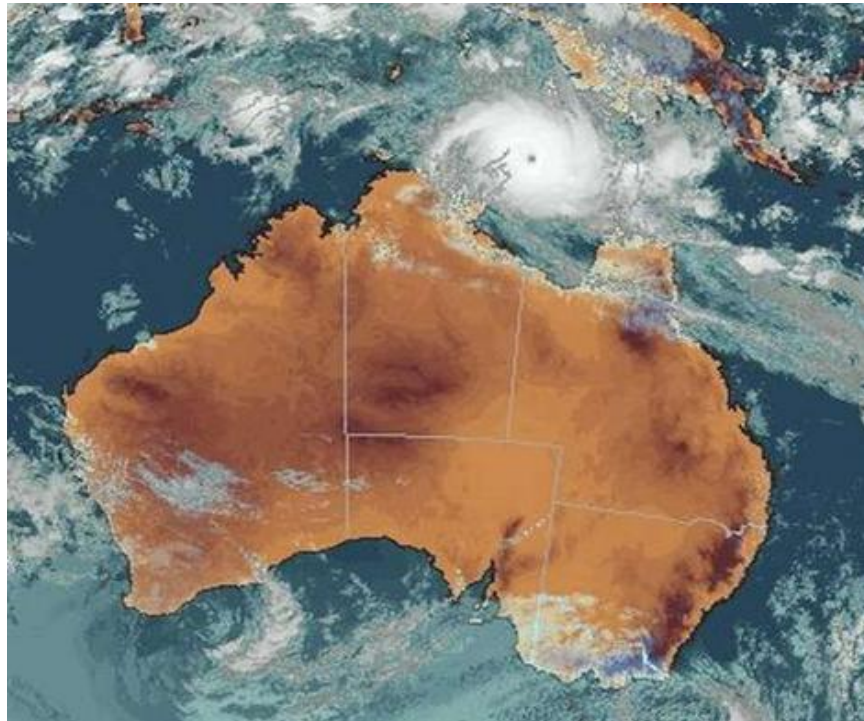
In the above verse many qualities and bounties of winds have been identified. All the benefits getting from wind are nothing but Mercy of Allah. The winds are not only essential for surviving life, they are also means of purification and bring blessing of Allah in terms of rain which make the soil fertile and fill the rivers and ponds with fresh water. Air helps international business and mixing up through sea-ways (sailing) and now by air-ways (floating in air). Those

¹²³ N.P.O. Green (et.al), *Biological Science*, 2nd ed., USA, Cambridge University Press, 1996, p.324.

¹²⁴ *Al-Qur'an*, 30:46.

who study and do research for utilizing wind will flourish and rejoice, while those who ignore or fail to understand Sign of Allah will perish.¹²⁵

2.13 Meteorology



Map Bureau of Meteorology

Meteorology is the study of the earth's atmosphere and especially the study of weather. A meteorologist is a person who studies the atmosphere. Meteorology is divided into a number of specialized sciences. Physical meteorology deals with the physical aspects of the atmosphere, such as the formation of clouds, rain, thunderstorms, and lightening. Physical meteorology also includes the

¹²⁵ Dr. A. Rahman, *op.cit.*, p. 52.

study of visual events such as mirages, rainbows, and halos. The study of the winds and the laws that govern atmospheric motion is called dynamic meteorology. Synoptic meteorology is the study and analysis of large weather systems that exist for more than one day. Weather forecasting is part of synoptic meteorology. Agricultural meteorology deals with weather and its relationship to crops and vegetation. The study of atmospheric conditions over an area smaller than 1 sq km (0.4 sq mi) is called micrometeorology. Climate describes the average weather of a region. Climatology, a division of meteorology, is the study of a region's average daily and seasonal weather events over a long period.¹²⁶ The following verse describes different phenomena occurring in the atmosphere and prompts people to observe these phenomena so that people may get benefit from such observation:

أَلَمْ تَرَ أَنَّ اللَّهَ يُزْجِي سَحَابًا ثُمَّ يُؤَلِّفُ بَيْنَهُ ثُمَّ يَجْعَلُهُ رُكَّامًا فَتَرَى الْوَدْقَ يَخْرُجُ مِنْ خِلَالِهِ
وَيُنزِلُ مِنَ السَّمَاءِ مِنْ جِبَالٍ فِيهَا مِنْ بَرَدٍ فَيُصِيبُ بِهِ مَنْ يَشَاءُ وَيَصْرِفُهُ عَنِ مَنْ يَشَاءُ يَكَادُ سَنَا
بَرْقِهِ يَذْهَبُ بِالْأَبْصَارِ ﴿سورة النور﴾

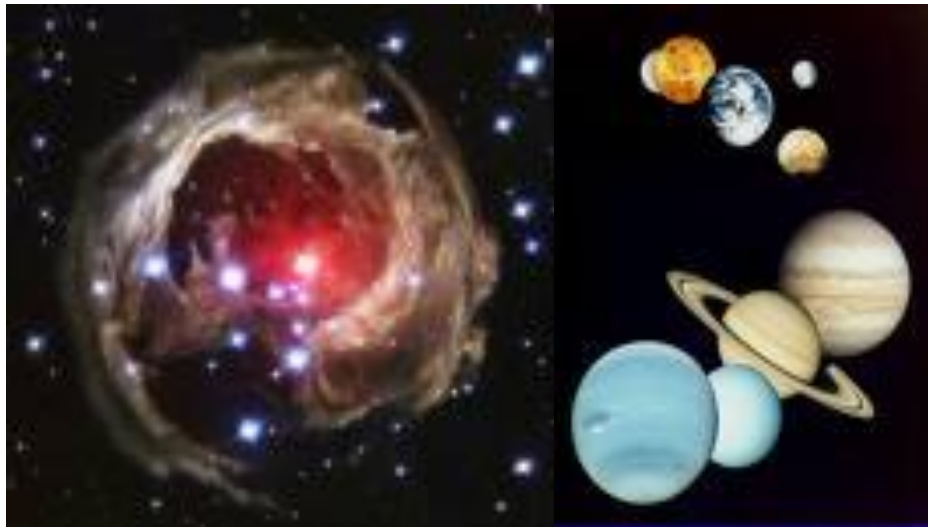
Do you not see that Allah drives the clouds, then gather them, then piles them in layers? Then you see rain coming out from between them: He sends down hail from the heavens, from the mountains which are therein,

¹²⁶ *Microsoft Encarta Reference Library, op.cit.*, s.v. "Meteorology"

and strikes with it whom He will and turn it away from whom He please.
The flash of the lightning almost snatches away the sight.¹²⁷

Not those winds, clouds in the atmosphere, together with the process of information of rain drops, hails and lighting all these topics of meteorology are mentioned in the above verse. By words “Do you not see” and “then you see rain”, Allah (S.W.T.) guides man to study these entire phenomenons.

2.14 Astronomy



Astronomy Map

Astronomy is the study of the universe and the celestial bodies, gas, and dust within it. Astronomy includes observations and theories about the solar system, the stars, the galaxies, and the general structure of space. Astronomy also includes cosmology, the study of

¹²⁷ *Al-Qur'an*, 24:43

the universe and its past and future. People who study astronomy are called astronomers, and they use a wide variety of methods to perform their research. These methods usually involve ideas of physics, so most astronomers are also astrophysicists, and the terms astronomer and astrophysicist are basically identical. Some areas of astronomy also use techniques of chemistry, geology, and biology.¹²⁸

Muslims have always had a special interest in astronomy. The moon and the sun are of vital importance in the daily life of every Muslim. By the moon, Muslims determine the beginning and the end of the months in their lunar calendar. By the sun Muslims calculate the time for prayer and fasting. It is also by means of astronomy that Muslims can determine the precise direction of the *Qiblah*¹²⁹. The most precise solar calendar, superior to the Julian, is the Jilali, devised under the supervision of Umar Khayyam. The sun, the stars, the moon, the earth and many other astronomical signs are mentioned in the Qur'ān. For a long time European philosophers and scientists believed that the earth stood still in the centre of the universe and every other body including the sun moved around it. In the West, this geocentric concept of the universe was prevalent right from the time of Ptolemy in the second century B.C. In 1512C.E. Nicholas Copernicus put forward his Heliocentric Theory of Planetary Motion,

¹²⁸ *Microsoft Encarta Reference Library, op.cit.*, s.v. "Astronomy"

¹²⁹ The direction in which the Muslims face when performing the salah (ritual prayer) towards the Ka'bah in Makkah.

which asserted that the sun is motionless at the centre of the solar system with the planets revolving around it.¹³⁰

In 1609C.E. the German scientist Yohannus Kepller published the *Astronomia Nova*. In this he concluded that not only do the planets move in elliptical orbits around the sun, they also rotate upon their axes at irregular speeds. With this knowledge it became possible for European scientists to explain correctly many of the mechanisms of the solar system, including the sequence of night and day. After these discoveries, it was thought that the Sun is stationary and does not rotate about its axis.¹³¹ The *Qur'an* mentions:

وَهُوَ الَّذِي خَلَقَ اللَّيْلَ وَالنَّهَارَ وَالشَّمْسَ وَالْقَمَرَ كُلٌّ فِي فَلَكٍ يَسْبَحُونَ ﴿سورة الأنبياء﴾

“And it is He who created the night and the day, and the sun and the moon, each one is floating in (its own) orbit.”¹³²

The Arabic word used in the above verse is *yasbahun*. This word is derived from the word *sabaha*. It carries with it the idea of motion that comes from any moving body. If this word is used for a person on the ground, it would not mean that he is rolling but would imply that he is walking or running. If this word is used for a person in water, it would not mean that he is floating but would imply that he is swimming. Similarly, if the

¹³⁰ Dr. Zakir Abdul Karim Naik, *op.cit.*, p.11-12.

¹³¹ *Idem*

¹³² *Al-Qur'an*, 21:33

word *yasbah* is used for a celestial body such as the sun, it would not only mean that it is flying through space but would also mean that it is rotating as it goes through space. Most school textbooks have now incorporated the fact that the sun rotates about its axis. The rotation of the sun about its own axis can be proved with the help of an equipment that projects the image of the sun on the top of a table, so that one can examine the image of the sun without being blended. It is noticed that the sun has spots which complete a circular motion once every 25 days i.e. the sun takes approximately 25 days to rotate round its axis.

The sun travels through space at roughly 240 km per second (240km/sec), and takes about 200 million years to complete one revolution around the centre of our Milky Way Galaxy.¹³³

The nature of the Sun and the nature of the moon are mentioned in the *Qur'ān*:

وَجَعَلَ الْقَمَرَ فِيهِنَّ نُورًا وَجَعَلَ الشَّمْسَ سِرَاجًا ﴿سورة نوح﴾

“And therein made the moon a light and the sun a Lamp [Siraja].”¹³⁴

The above Ayah shows that the difference between the sun and the moon is very obvious. It states that the sun is a Lamp, and the moon is a Light. What's the difference between both? A lamp is

¹³³Dr. Zakir Abdul Karim Naik, *op.cit.*, p.13.

¹³⁴ *Al-Qur'an*, 71:16

something that produces light by using some kind of energy while the light is the result of that lamp. This is what the *Concise Columbia Encyclopedia* says about the sun:

...The sun's temperature is high enough for the occurrence of nuclear reactions, which are assumed to be the source of the sun's energy. Hans Bethe proposed a cycle of nuclear reactions known as the carbon cycle, in which carbon acts much as a catalyst, while hydrogen is transformed by a series of reactions into helium and large amounts of high energy gamma radiation are released.¹³⁵

And this is what *The American Heritage Dictionary of the English Language* says about the moon: “The natural satellite of Earth, visible by reflection of sunlight and having a slightly elliptical orbit.”¹³⁶ As we can see, the moon reflects the sun's light. This is exactly what the *Qur'an* says about the sun and the moon. The *Qur'an* also mentions the sun as a *Siraj*. *Siraj* is an Arabic term that means a mass of fire, which produces light. On the other hand, the *Qur'an* does not mention the moon as being in the state of *Siraj*, which is totally in conformity with the modern scientific notion about the sun and the moon.

لَا الشَّمْسُ يَنْبَغِي لَهَا أَنْ تُدْرِكَ الْقَمَرَ وَلَا اللَّيْلُ سَابِقُ النَّهَارِ وَكُلٌّ فِي فَلَكٍ يَسْبَحُونَ ﴿سورة يس﴾

¹³⁵ *Concise Columbia Encyclopedia*, New York, Columbia University Press, 2001, s.v. “Sun”

¹³⁶ *The American Heritage Dictionary of the English Language*, 4th ed., United States, Houghton Mifflin Company, 2000, s.v. “Moon”

“It is not (possible) for the sun to overtake the moon, nor can the night outpace the day. They move each in an orbit.”¹³⁷

Here is an essential fact that is clearly stated: the existence of the sun's and moon's orbit, and also a reference is made to the travelling of these bodies in space with their own motion. This is what The *Concise Columbia Encyclopedia* says about the moon and the sun's orbit. “The lunar orbit is elliptical, and the average distance of the moon from the earth is about 240,000 mi [mile]”.¹³⁸ “The sun is c.28, 000 light-years from the nucleus and takes 200 million years to revolve once around the galaxy.”¹³⁹ Also, the *Qur'an* asserts:

وَالشَّمْسُ تَجْرِي لِمُسْتَقَرٍّ لَهَا ذَلِكَ تَقْدِيرُ الْعَزِيزِ الْعَلِيمِ ﴿۱۰۰﴾ وَالْقَمَرَ قَدَرْنَا مَنَازِلَ حَتَّىٰ عَادَ كَالْعُرْجُونِ
الْقَدِيمِ ﴿۱۰۱﴾ (سورة يس)

“The Sun is proceeding to its resting place; that is the decree of the Mighty One, All Knowing. And as regards moon, We have appointed for it mansions till it becomes as an old dry palm-branch.”¹⁴⁰

In this verse the *Qur'an* explicitly guides about the fact that the sun has an appointed or allotted amount of time that it will last for.

¹³⁷ *Al-Qur'an*, 36:40

¹³⁸ *Concise Columbia Encyclopedia, op.cit.*, s.v. “sun's orbit”

¹³⁹ *Ibid.*, s.v. “sun light”

¹⁴⁰ *Al-Qur'an*, 36:38-39.

This agrees with the modern science which says that the sun will probably have a limited span of 5 billion years. However, the verse also mentions the moon's independent orbit around the earth in which it returns regardless of the sun's status with the earth. Here we can infer that the sun and the moon have independent orbits, one closely connected to that of the earth, which is the moon, and the other with a limited term of orbit and life span and independent of the moon's orbit.

In the above quoted verses, we see no reference to any facts stating the sun is orbiting around the earth, which at the time was a very popular belief. Rather, we see the *Qur'ān* stating that the moon and sun are quite independent of each other and that they follow the paths divinely prescribed for them. Muslims at the time followed whatever scientific fact was in popular reason and in fact, when Ibn Shatir during the 12th-13th century hypothesized that the earth was not the center of the universe and proved it by trigonometric means. Muslims did not visualize any significant problem with his theory. Later on, Copernicus restated this theory to the Europeans. He received the credit for the discovery even until today. At the time, his theory was rejected and he was threatened by the church to change his opinion; which he did.

We can see the Muslims throughout history have had no problems accepting true scientific facts as it was part of

their religious duty, but European Christians have always had to separate religion and science even until this very moment.

2.15 Geography



Geography is the science that deals with the distribution and arrangement of all elements of the earth's surface.¹⁴¹ Muslim scholars paid great attention to the study of geography. In fact, the Muslims' great concern for geography originated with their religion. The *Qur'an* encourages people to travel throughout the

¹⁴¹ *Microsoft Encarta Dictionary, op.cit.*, s.v. "Geography"

earth to see God's signs and patterns everywhere.¹⁴² Islam prompts Muslims to have at least enough knowledge of geography to know the direction of the *Qiblab*¹⁴³ in order to pray five times a day.

خَلَقَ السَّمَاوَاتِ بِغَيْرِ عَمَدٍ تَرَوْنَهَا وَأَلْقَى فِي الْأَرْضِ رَوَاسِيَ أَنْ تَمِيدَ بِكُمْ ... (سورة لقمان)

“He created the heavens without any pillars as you see it, and set into the earth mountains so that it may not shake with you...”¹⁴⁴

Until after 1300 years of the revelation of the *Qur'an* the human treasure of knowledge was not acquainted with this fact of mountains. But now geography has come to know it and in modern geographic terms it is called *isostasy*¹⁴⁵- equilibrium within Earth's crust: a state of equilibrium between forces such as accumulated ice pushing down on a section of the Earth's surface and those pushing up from below.¹⁴⁶

¹⁴² *Al-Qur'an*, 16:36

¹⁴³ The direction in which the Muslims face when performing the salah (ritual prayer) towards the Ka'bah in Makkah.

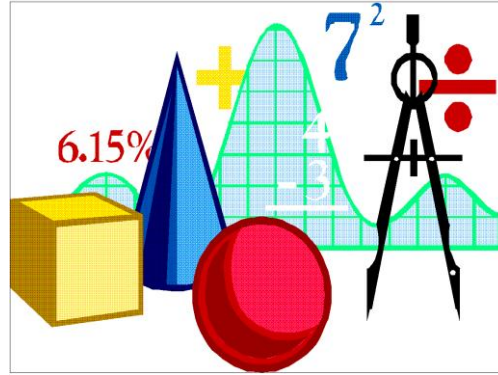
¹⁴⁴ *Al-Qur'an*, 31:10

¹⁴⁵ Wahiduddin Khan, *Ilmi Jadid Ka Challenge (Urdu)*, Delhi, Hindustan Publications, 1964, p.176.

¹⁴⁶ *Microsoft Encarta Dictionary*, *op.cit.*, s.v. “Isostasy”

2.16 Mathematics

Muslim mathematicians excelled in geometry, as can be seen in their graphic arts. Al-Biruni made a significant contribution towards the establishment of trigonometry



Mathematical Tools

as a distinct branch of mathematics. He also excelled in the fields of historiography, geology and mineralogy. Other Muslim mathematicians made significant progress in the classification of mathematical numbers. *Algorithms*, the processes of mathematics and computer science, are named after the great Arabic mathematician al-Khwarizmi (d.840 C.E.) Our modern number system is called *Hindu-Arabic* in recognition of its origins in the number systems of India and Arabia. Our number system depends fundamentally on the number 0 (zero) which was invented by Arab mathematicians. A numeral is sometimes called a *cipher* (hence *encipher*, *decipher*) from the Arabic word *sifr* meaning zero.¹⁴⁷

It is interesting to note that Muslims developed different mathematical concepts under the impact of various Qur'anic inspirations. The *Qur'ān* guides in this context as:

¹⁴⁷ Adrian Baddeley, "Mathematics and Islam", <http://www.maths.uwa.edu.au>.

يَأْيُهَا الَّذِينَ آمَنُوا إِذَا تَدَايَنْتُمْ بِدِينٍ إِلَىٰ أَجَلٍ مُّسَمًّى فَاكْتُبُوهُ وَلْيَكْتُب بَيْنَكُمْ كَاتِبٌ بِالْعَدْلِ
وَلَا يَأْب كَاتِبٌ أَنْ يَكْتُبَ كَمَا عَلَّمَهُ اللَّهُ فَلْيَكْتُب ... ◻ (سورة البقرة)

O you who believe! When you deal with one another in transactions involving debt for a fixed period of time reduce them to writing. Let a scribe write down faithfully as between the parties; let not the scribe refuse to write as Allah has taught him, so let him write...¹⁴⁸

كُتِبَ عَلَيْكُمُ إِذَا حَضَرَ أَحَدَكُمُ الْمَوْتُ إِنْ تَرَكَ خَيْرًا الْوَصِيَّةَ لِلْوَالِدَيْنِ وَالْأَقْرَبِينَ بِالْمَعْرُوفِ
حَقًّا عَلَى الْمُتَّقِينَ ◻ (سورة البقرة)

It is prescribed for you that when death approaches any one of you and he leave (some) property behind him then he should bequeath to parents and the near relatives, in an equitable manner. This is an obligation for those who fear Allah.¹⁴⁹

لِّلرِّجَالِ نَصِيبٌ مِّمَّا تَرَكَ الْوَالِدَانِ وَالْأَقْرَبُونَ وَلِلنِّسَاءِ نَصِيبٌ مِّمَّا تَرَكَ الْوَالِدَانِ وَالْأَقْرَبُونَ
مِمَّا قَلَّ مِنْهُ أَوْ كَثُرَ نَصِيبًا مَّفْرُوضًا ◻ وَإِذَا حَضَرَ الْقِسْمَةَ أُولُو الْقُرْبَىٰ وَالْيَتَامَىٰ وَالْمَسَاكِينُ
فَارزُقُوهُمْ مِنْهُ وَقُولُوا لَهُمْ قَوْلًا مَّعْرُوفًا ◻ وَلْيَخْشَ الَّذِينَ لَوْ تَرَكَوْا مِنْ خَلْفِهِمْ ذُرِّيَّةً ضِعَافًا
خَافُوا عَلَيْهِمْ فَلْيَتَّقُوا اللَّهَ وَلْيَقُولُوا قَوْلًا سَدِيدًا ◻ (سورة النساء)

There is a share for men in what has been left by parents and nearest relatives and there is a share for women in what has been left by parents and nearest relatives, whether the property be small or large – a fixed share. And if at the time of division other relatives, and orphans and poor are present, give them some thing out of it, and speak kind words.

¹⁴⁸ *Al-Qur'an*, 2:282

¹⁴⁹ *Ibid.*, 2:180

People should be afraid that if they had left behind them helpless children what would have been their anxiety about them. So they should fear Allah and speak properly.¹⁵⁰

2.17 PLATE TECTONICS

According to the Plate Tectonics theory the outer shell of the earth is made up of thin, rigid plates that move relative to each other. The



Plate Tectonics

The theory of plate tectonics was formulated during the early 1960s, and it revolutionized the field of geology. Scientists have successfully used it to explain many geological events, such as earthquakes and volcanic eruptions as well as mountain building and the formation of the oceans and continents. Plate tectonics arose from an earlier theory proposed by German scientist Alfred Wegener in 1912. Looking at the shapes of the continents, Wegener found that they fit together like a jigsaw puzzle. Using this observation along with geological evidence he developed the theory of continental drift, which states

¹⁵⁰ *Ibid.*, 4:7-9

that today's continents were once joined together into one large landmass.¹⁵¹

A careful perusal of the *Qur'an* and the Ahadith of Prophet Muhammad (S.A.W.S) lead us to this assertion that one of the most obvious features of Doomsday is that the Earth will be convulsed with a series of earthquakes, followed by one another and at last by one mighty earthquake the like of which has never been seen or heard before. The final earthquake that would heralds the Doomsday, where the earth will suffer mighty convulsions and vibrations, this would results up in the breaking of the Earth's crust into fragments and it will destroy all physiographical features including mountains. The earth like a pregnant mother will throw up her burdens within and outside herself. This would probably mean that all volcanoes both dormant and active would burst over with internal molten lava gushing from everywhere. The *Qur'an* visualizes the terrible scene with the following verse:

إِذَا زُلْزِلَتِ الْأَرْضُ زِلْزَالَهَا ۖ وَأَخْرَجَتِ الْأَرْضُ أَثْقَالَهَا ۗ (سورة الزلزلة)

“When the earth will be shaken with utmost force. And the earth will throw up her burden”¹⁵² [from within its core].

The description of the earth being “shaken with utmost force” is understood to indicate a continuous series of earthquakes, preceding the final one. These earthquakes could be of severe magnitude. With

¹⁵¹ Microsoft Encarta Reference Library, *op.cit.*, s.v. “plate tectonics”

¹⁵² *Al-Qur'an*, 99:1-2

the present scientific knowledge we know, that the earthquakes measuring about eight on the Richter scale to be catastrophic. Anything over and above this would turn cataclysmic. This in turn would trigger up large-scale volcanic activity, with the earth's crust opened up, and fragmented.

The verse “throw up her burden (from within)” would suggest that the volcanoes will unleash a terrible heat from its molten lava, which will be almost everywhere, leaving behind a trail of death and destruction. To add to this confusion there may be a rain of volcanic ashes and dust. These volcanic rains may bury many forms of life, destroy vegetation, dry up rivers, may melt up hills and mountains, and make then oceans boil over. To sum up, utter chaos would reign everywhere.

The worse would be, yet to follow. The *Qur'ān* affirms that there could be loud, thunderous noise everywhere, adding to the terror of those left alive. We know by now, that these earthquakes, volcanoes, vibrations and upheavals in the earth are caused by movement of tectonic plates. The *Qur'ān* refers to the further destruction in these words:

كَلَّا إِذَا دُكَّتِ الْأَرْضُ دَكًّا دَكًّا (سورة الفجر)

“Nay! When the earth is pounded to flatness.”¹⁵³

Here the verse clearly draws an allusion to the tectonic plates, which after unleashing death and destruction through volcanoes and

¹⁵³ *Ibid.*, 89:21

earthquakes, by grinding against one another, the mountains will break and will be scattered into dust, and will become like clouds of carded wool. The plates will keep on grinding at a faster rate until such time that the earth and everything in it is grounded to atoms. This will sound the final curtain call heralding the end of this earth.

The scientists describe the violent activity to be the result of an “awesome force” that is at work beneath the crust of the earth.¹⁵⁴ The *Qur’ān* mentions:

سُرِّيهِمْ آيَاتِنَا فِي الْأَفَاقِ وَفِي أَنْفُسِهِمْ حَتَّىٰ يَتَبَيَّنَ لَهُمْ أَنَّهُ الْحَقُّ... ﴿سورة فصلت﴾

“Soon, We shall show them Our signs in the horizons and in their own souls, until it will be manifest to them that it [*Qur’ān*] is the Truth...”¹⁵⁵

But many among the scientists may fail to appreciate that this awesome force at work is from Allah. He gives life and death and will again make the human beings rise up on the day of Judgment in accordance with His Will.

وَهُوَ الَّذِي أَحْيَاكُمْ ثُمَّ يُمِيتُكُمْ ثُمَّ يُحْيِيكُمْ إِنَّ الْإِنْسَانَ لَكَفُورٌ ﴿سورة الحج﴾

“And it is He who has given you life, and He causes you to die and will make you live again. Surely man is ungrateful.”¹⁵⁶

¹⁵⁴ *www.najaco.com*, s.v. “plate tectonics”

¹⁵⁵ *Al-Qur’an*, 41:53

¹⁵⁶ *Ibid.*, 22:66

2.18 MASS EXTINCTIONS



Mass Extinction

Extinction is a natural process. As the planet's surface and climate have changed over the 4.6 billion years of its existence, species have disappeared and new ones have evolved to take their place.

Each year, a relatively small number of species become extinct naturally, a phenomenon called the *natural, or background rate of extinction*. But fossils and other evidence indicate that there have been several periods when the earth's biodiversity was drastically reduced by *mass extinctions* in which large number of species became extinct each year. Evidence also support this fact that these mass extinctions were followed by other periods called *radiations*, when the diversity

increased and spread over several million years.¹⁵⁷ Most scientists agree that life on earth is now subjected to most severe extinction. However, scientists lack the perfection of knowledge about the exact number of exist and extinct species. Estimates vary, but the most widely accepted figure lies between 10 and 13 million species. Of these, biologists estimate that as many as 27,000 species are becoming extinct each year. This points towards extinction of approximately 3 species per hour.¹⁵⁸

The *Qur'an* makes reference to this fact that Allah's omnipotence encompasses the power of replacement or extinction of any species.

أَلَمْ تَرَ أَنَّ اللَّهَ خَلَقَ السَّمَاوَاتِ وَالْأَرْضَ بِالْحَقِّ إِنَّ يَشَاءُ يُدْهِبُكُمْ وَيَأْتِ بِخَلْقٍ جَدِيدٍ ﴿١٥٧﴾ وَمَا ذَلِكَ عَلَى اللَّهِ بِعَزِيزٍ ﴿١٥٨﴾ (سورة إبراهيم)

“Do you not see that Allah has created the heavens and the earth with truth? If He will, He can remove you and bring in a new creation. And that is no great matter for Allah.”¹⁵⁹

This verse of the Holy *Qur'an* is a clear Sign to those paleontologists and other scientists that what has been discovered by

¹⁵⁷G. Tyler Miller, JR., *Environmental Science Working with the Earth*, 6th ed., U.S.A., Wordsworth publishing Company, 1997, p.432.

¹⁵⁸ *Microsoft Encarta Reference Library, op.cit.*, s.v. “The current extinction crisis”

¹⁵⁹ *Al-Qur'an*, 14:19-20. The last part of the verse “and that is no great matter for Allah” suggests that Allah (S.W.T.) did away with entire creations in the past. Such as Dinosaurs which flourished before the Cretaceous Period. They were wiped out without leaving a trace of them behind. The appearance of Birds and Mammals, a totally new creation to replace them as found from the fossil records, suggests that such extinctions have been caused by Allah in the past and He has replaced them with new and better creations of His choice. If He so wishes, then he can do away with all mankind and replace them with a new creation. This suggests that human beings as a whole stand helpless before the Will of Allah, if He were to decide on this course of action.

them from the fossil record is true. It also tells them not to be puzzled by new species of animals found in the subsequent strata of sediments as Allah created them all, as he had created the animals before them, and to totally abandon their mindless debates, endless seminars, concocting fanciful stories and hypotheses arising from totally a product of their futile imaginations, and acknowledge that Allah, alone is worthy to be worshipped.

2.19 THE ORIGIN OF LIFE

Scientists opine that life appears to have originated in the oceans about four billion years ago, probably from chemical reactions of molecules such as water, carbon dioxide, and methane. The first life forms for which there is fossil evidence are prokaryotes, one-celled organisms. These organisms lacked a nucleus and reproduced only by cell division. Today's bacteria and cyanobacteria (often called blue-green algae) are descendants of these Archean ancestors.¹⁶⁰ They further assert that water is the living component of all living cells. Without water, life is not possible. When the possibility of life on another planet is discussed, the first question emerges is that; is there a sufficient quantity of water to support life? The *Qur'an* provides this information in following verses:

¹⁶⁰ *Microsoft Encarta Reference Library, op.cit.*, s.v. "Orgin of Life"

أَوَلَمْ يَرَ الَّذِينَ كَفَرُوا أَنَّ السَّمَاوَاتِ وَالْأَرْضَ كَانَتَا رَتْقًا فَفَتَقْنَاهُمَا وَجَعَلْنَا مِنَ الْمَاءِ كُلَّ شَيْءٍ حَيًّا
أَفَلَا يُؤْمِنُونَ ﴿سورة الأنبياء﴾

“Have not the disbelievers pondered that the heavens and the earth were of one piece, then We separated them and that We made of water every living thing? Will they not then believe?”¹⁶¹

وَاللَّهُ خَلَقَ كُلَّ دَابَّةٍ مِّن مَّاءٍ ... ﴿سورة النور﴾

“And Allah has created every animal from water...”¹⁶²

That is water is the origin of life. Whoever or whatever has got life, it was got through water and its existence depends on water.¹⁶³

Further evolutionists hold that living things spontaneously formed themselves from inanimate matter. Evolutionists answer this question by saying that the first organism was a cell that emerged from inanimate matter by chance. According to the theory, at a time when the earth consisted of inanimate rocks, soil, gases and so on, a living organism formed by chance through the effects of wind, rain, and lightning. This evolutionary claim, however, is contrary to one of the most fundamental rules of biology: Life comes only from life, which means that inanimate matter cannot generate life.

¹⁶¹ *Al-Qur'an*, 21:30.

¹⁶² *Ibid.*, 24:45

¹⁶³ Shams Pirzada, *op.cit.*, vol 2, p.1075.

The belief that inanimate matter can produce life is actually a medieval superstition. According to this theory, called "spontaneous generation", it was believed that mice sprang naturally from wheat, or maggots arose "spontaneously" from meat. At the time when Darwin put forward his theory, the belief that microbes of their own accord formed themselves from inanimate matter was also very common.

The findings of the French biologist Louis Pasteur put an end to this belief. As he put it: "The claim that inanimate matter can originate life is buried in history for good."¹⁶⁴

After Pasteur, evolutionists still maintained that the first living cell formed by chance. However, all experiments and research carried out throughout the 20th century ended in failure. The "chance" formation of a living cell aside, it has not even been possible to produce a living cell by a conscious process in the most advanced laboratories of the world.

Therefore, the question of how the first living organism emerged puts the evolutionary claim into a quandary right at the first step. One of the chief defenders of the theory of evolution at the molecular level, Prof. Jeffrey Bada, makes this confession: "Today as we leave the twentieth century, we still face the biggest unsolved

¹⁶⁴ Sidney Fox, Klaus Dose, *Molecular Evolution and The Origin of Life*, New York: Marcel Dekker, 1977. p. 2

problem that we had when we entered the twentieth century: How did life originate on Earth?”¹⁶⁵

While invalidating the theory of evolution, the law “life comes from life” also shows that the first life on earth came again from life, which means that it was created by Allah. He is the only One Who can give life to inanimate matter. In the words of the *Qur’an*:

يُخْرِجُ الْحَيَّ مِنَ الْمَيِّتِ وَيُخْرِجُ الْمَيِّتَ مِنَ الْحَيِّ وَيُحْيِي الْأَرْضَ بَعْدَ مَوْتِهَا وَكَذَلِكَ تُخْرَجُونَ ﴿سورة الروم﴾

“He brings forth the living from the dead, and He brings forth the dead from the living, and He revives the earth after its death. And likewise you will be brought forth.”¹⁶⁶

¹⁶⁵Jeffrey Bada, "Origins", *Earth*, February 1998, p. 40

¹⁶⁶ Al- *Qur’an*, 30:19.

2.20 Space Exploration



Space Exploration

Space Exploration is a quest to use space travel to discover the nature of the universe beyond Earth. Since ancient times, people have dreamed of leaving their home planet and exploring other worlds. In the later half of the 20th century that dream became reality. The space age began with the launch of the first artificial satellites in 1957. A human being first went into space in 1961. Since then, astronauts and cosmonauts have ventured into space for ever greater lengths of time, even living aboard orbiting space stations for months on end. Two dozen people have circled the Moon or walked on its surface. At the same time, robotic explorers have journeyed where humans could not go, visiting all but one of the solar system's

major worlds. Unpiloted spacecraft have also visited a host of minor bodies such as moons, comets, and asteroids. These explorations have sparked the advance of new technologies, from rockets to communication equipment to computer. Spacecraft studies have yielded a bounty of scientific discoveries about the solar system, the Milky Way Galaxy, and the universe. And they have given humanity a new perspective on earth and its neighbours in space.¹⁶⁷

Space exploration step is insignificant compared to the vastness of the universe. Because of the infinite size of the universe there is no possibility for man to explore or go beyond the boundary of the universe. In fact there is no boundary of the universe, Allah says:

يَمْعَشَرِ الْجِنَّ وَالْإِنْسِ إِنْ اسْتَطَعْتُمْ أَنْ تَنْفُذُوا مِنْ أَقْطَارِ السَّمَاوَاتِ وَالْأَرْضِ فَانْفُذُوا لَا تَنْفُذُونَ إِلَّا بِسُلْطَانٍ ﴿١٠٠﴾ فَبِأَيِّ آلَاءِ رَبِّكُمَا تُكَذِّبَانِ ﴿سورة الرحمن﴾

“O assemblies of Jinn and men! If you are able to pass out of the borders of the heavens and the earth, then pass out. You can not pass out but with authority. Then which of your Lord’s Sign will you deny!”¹⁶⁸

This verse has given the indication of the vastness of the universe and limited ability of man. The sun, moon, stars and other objects are created by Allah for the benefit of man, as gifts from

¹⁶⁷Microsoft Encarta Reference Library, *op.cit.*, s.v. “Space exploration”

¹⁶⁸ *Al-Qur’an*, 55:33-34.

Him. They may be studied within man's limitations and may be made useful in many ways. Allah has not put any condition or hindrance in studying the objects of the sky.

وَسَخَّرَ لَكُمُ اللَّيْلَ وَالنَّهَارَ وَالشَّمْسَ وَالْقَمَرَ وَالنُّجُومَ مُسَخَّرَاتٌ بِأَمْرِهِ إِنَّ فِي ذَلِكَ لَآيَاتٍ لِّقَوْمٍ يَعْقِلُونَ

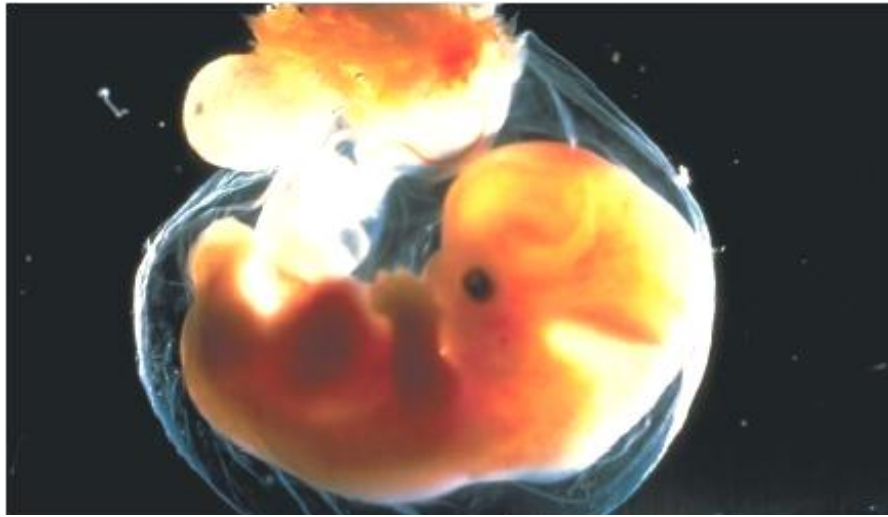
■(سورة النحل)

“And for you He has subjected the night and the day, and the sun and the moon to be of service, and the stars are also subjected in service by His command. Verily, herein are signs for the people who have sense.”¹⁶⁹

In the above verse, the words “and for you He has subjected” and “who have sense” are worthy of notice. Man may be more benefited from the heavenly objects on study, reflection and applying knowledge gathered from such studies.

¹⁶⁹*Ibid*, 16:12.

2.21 Embryology



Embryo

The *Qur'ān* is replete with the verses regarding the formation of human embryo and fetus. A brief outline of human development in the womb as modern science understands it is:

1. An unfertilized egg is produced by the female, and is subsequently placed in her Fallopian tubes.
2. The male cohabits with the female, and normally a single sperm cell fertilizes the egg.
3. The fertilized egg retreats into the uterus, and attaches itself to the uterine wall.
4. Embryological growth (roughly 3 months).
5. Fetal growth (6 months).
6. Birth

A general overview of human development given in the *Qur'an* is:

وَقَدْ خَلَقَكُمْ أَطْوَارًا ﴿١٤﴾ (سورة نوح)

“When He has created you causing you to pass through various stages.”¹⁷⁰

وَاللَّهُ خَلَقَكُمْ مِنْ تُرَابٍ ثُمَّ مِنْ نُطْفَةٍ... ﴿١١﴾ (سورة فاطر)

“Allah created [you] from dust, then from sperm-drop...”¹⁷¹

The first verse provides broader guidelines about the formation of an embryo in different stages. The second verse puts some perspective on the whole affair. How man originally came from dust (Adam), and then from a drop? There are at least four specific details regarding human development in the *Qur'an* which modern science has revealed only within the last few centuries and in some cases only in this present century. The first concerns the emission of semen:

أَلَمْ يَكُ نُطْفَةً مِّن مَّنِيٍّ يُُمْنَىٰ ﴿٣٧﴾ (سورة القيامة)

“Was he not a drop of semen which is dropped (in the womb)”¹⁷²

The second important detail in the *Qur'an* on human development is the description of the fertilizing semen:

¹⁷⁰ *Ibid.*, 71:14.

¹⁷¹ *Ibid.*, 35:11.

¹⁷² *Ibid.*, 75:37.

خُلِقَ مِنْ مَّاءٍ دَافِقٍ ﴿سورة الطارق﴾

“He [man] is created from a gushing fluid.”¹⁷³

إِنَّا خَلَقْنَا الْإِنْسَانَ مِنْ نُطْفَةٍ أَمْشَاجٍ... ﴿سورة الإنسان﴾

“We created man from a sperm mixed...”¹⁷⁴

ثُمَّ جَعَلْنَا نَسْلَهُ مِنْ سُلَالَةٍ مِّنْ مَّاءٍ مَّهِينٍ ﴿سورة السجدة﴾

“Then He made his breed from the essence of the despised fluid.”¹⁷⁵

The second and third verses relate to the contents of semen. Modern science has established that semen is in fact a composition of different secretions which come from four different glands during ejaculation viz the testicles, the seminal vesicles, the prostate gland, and the urinary tract glands. The actual sperm cells come from the testicles; the other three glands produce no fertilizing agents.¹⁷⁶ The Qur’ān goes farther than just informing us that semen is a mixture of liquids. It tells that only the “essence” of the liquid is used (the "despised" comes from the fact that semen is emitted from the same place as urine, and thus may be despicable in some people's sight). The Arabic word for “essence” in this verse signifies

¹⁷³ *Ibid.*, 86:6.

¹⁷⁴ *Ibid.*, 76:2

¹⁷⁵ *Ibid.*, 32:8

¹⁷⁶ N.P.O. Green (et.al), *op.cit.*, p.752-753.

extracting the absolute best out of something.¹⁷⁷ The numbers tell the story: a normal ejaculation involves about 3 ml of fluid containing between 120,000,000 and 150,000,000 sperm cells. Of these cells, only one fertilizes the egg in the female, and this is the point which the *Qur'ān* (32:8) alludes to.

A third detail of human development mentioned in the *Qur'ān* concerns the newly fertilized egg:

أَلَمْ يَكُ نُطْفَةً مِّن مَّنِيِّ يُمْنَى ۖ ثُمَّ كَانَ عَلَقَةً فَخَلَقَ فَسَوَّى ۖ (سورة القيامة)

“Was he not a drop of semen which is dropped (in the womb) Then he became a clot, then (Allah) formed his body and put it in order”.¹⁷⁸

Recent observations of the fertilized egg in the womb have revealed that the egg literally implants itself into the uterine wall. It clings (clots) in the strongest sense, and it remains like so in the early stage of development. On top of that, the developing organism acts as a leech on the female host in the sense that it draws its sustenance directly from its mother's body.¹⁷⁹

¹⁷⁷Ibrahim Mustafa, *Al Mu'jamu Al Wasit (Arabic Dictionary)*, Istambul Turkey, Al Maktab Al Islamiya, 1972, vol.1, p.440-441.

¹⁷⁸ *Al-Qur'an*, 75:37-38.

¹⁷⁹Keith L. Moore, “A Scientist's Interpretation of References to Embryology in the Qur'an” <http://www.quran.org.uk/index.html>.

The *Qur'ān* gives at another place an account of embryological development (the first three months) in the following verses:

ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَقَةً فَخَلَقْنَا الْعَلَقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ
 أَنْشَأْنَاهُ خَلْقًا آخَرَ فَتَبَارَكَ اللَّهُ أَحْسَنُ الْخَالِقِينَ ﴿سورة المؤمنون﴾

Then We made the sperm a clot of blood [*Alaqah* – leech-like structure], and the clot a lump of flesh [*Mudghab* – chewed-like substance], then We created the lump of bones [*Idhām*], then clothed the bones with flesh [*Lahm* – flesh, muscles], and then produced it as another creation So Blessed be Allah, the Best of Creators!¹⁸⁰

...فَإِنَّا خَلَقْنَاكُمْ مِّنْ تُرَابٍ ثُمَّ مِّنْ نُطْفَةٍ ثُمَّ مِّنْ عَلَقَةٍ ثُمَّ مِّنْ مُّضْغَةٍ ... (سورة الحج)

...We surely first created you from dust, then from drop of water, then from a clot, and then from a lump of flesh [*Mudghab*]...¹⁸¹

Verse 14 of chapter 23 divides embryological development into four stages. The first stage picks up right after fertilization “drop”, and is characterized by an *Alaqah* or “leech-like structure” which describes how the egg implants itself into the uterus.

The second stage describes the embryo as evolving into a *Mudghab* which means something which has been chewed (especially a piece of meat), or which has the appearance of having been

¹⁸⁰ *Al-Qur'an*, 23:14

¹⁸¹ *Al-Qur'an*, 22:5

chewed. This seemingly crude description is in fact quite accurate. After the fertilized egg lodges itself in the uterus, it begins to receive its first nutrients and energy from its mother. Consequently, it begins to grow rapidly, and after a week or two it looks like a ragged piece of meat to the naked eye. This effect is enhanced by the development of small buds and protrusions which will eventually grow into complete organs and limbs.

In next two stages, bones are being made from the *Mudghab*, followed by the “clothing” of the bones with flesh or muscles. After approximately four weeks, a process called ‘differentiation’ begins, where groups of cells within the embryo transform themselves to form certain large organs. One of the earliest structures to develop in this stage is the cartilaginous basis of the human skeleton (in subsequent months, the cartilage hardens or ossifies). It is followed soon after by the appearance of a host of other organs including muscles, ears, eyes, kidneys, heart, and more.¹⁸² This maintains the order described in the *Qur’an*. The verse (23:14) concludes with the growth of the organism in the womb followed by its birth.

¹⁸²*Microsoft Encarta Reference Library, op.cit.*, s.v. “Embriology”

2.22 Cupping and microsurgery

“There is healing in cupping.”¹⁸³ This tradition of Prophet Muhammad (S.A.W.S) has been safely preserved by our scholars in different books written on *Hadith*. This tradition of the Prophet finds a mention in Sahih Al-Bukhari, Tirmidhi and the Sunan Abu Da'ud.



Microsurgery

Cupping as it was then called used to be practiced during the time of Prophet Muhammad (S.A.W.S) as a cure for certain medical problems. Usually puncture like incisions would be made on different sites of the body or the places infected in the body by a

¹⁸³ Abu Abdullah Muhammad bin Isma'il Al-Bukhāri, *Sahih Al-Bukhari*. Riyadh, Saudi Arabia, Maktab Dar-us-Salam, 1994, vol.6, Hadith no. 600.

professional “cupper”,¹⁸⁴ whose services were hired for this purpose, and after making one or more incisions the cupper would then proceed to suck blood from these sites using his mouth and spit out the blood that had been sucked.¹⁸⁵ In another way of cupping, leeches¹⁸⁶ were attached on the infected areas to suck the blood or eat putrid flesh.

With the advancements of Modern medicine and the rapid studies made in the advancements of Modern surgery, this method of treatment was discarded except for a few *Unani Hakīms* who still practice it even today in India. In modern medicine this system of cupping is still visible but in a changed way. When a Pathologist drawing blood from a patient intravenously and tests that in a laboratory for any possible infection, he is actually practicing cupping of the olden times.

If a healthy person comes forward to donate blood for some person who is in need of it, then this process can be also classified under cupping, as blood is drawn out of the body using a syringe. Nowadays cupping glasses are being used to increase the blood

¹⁸⁴ The cupper was usually paid handsomely for the services rendered. This job was considered dangerous because there was every chance of the cupper ending up as a victim of some infection or the other.

¹⁸⁵ www.najaco.com, s.v. “cupping”

¹⁸⁶ Leech is a fresh blood sucking water worm that sucks blood or eats putrid flesh. On such species (class:Hirudinea) has been used in medical treatments to bleed patients or to away putrid flesh from a wound.

supply in the tissues below.¹⁸⁷ In short, if a reasonable quantity of blood is drawn from the body by using any other device or method then this process can also be classified under the subject cupping.

In modern microsurgery this method has found its place and recently scientific findings strongly recommended this method. The Journal of the *Norwegian Medical Association* recently published an experimental study about an unusual story of Leeches used in microsurgery to prevent harmful swellings in replanted body parts. Earlier to this the *British Medical Journal* had carried out a similar study on the use of Leeches in modern microsurgery in the year 1994.

It is really tragic that we now need the western scientists to certify a cure in "Cupping" through Leeches, which our Prophet (S.A.W.S) not only practiced, but also suggested to others that one can safely look for a cure and a certain treatment for it for certain medical conditions and a cure can be sought through the method especially in cases of clotted or congealed blood.¹⁸⁸

¹⁸⁷ The cupping glass is a glass container in which a partial vacuum is created by heat or suction that is applied to the skin.

¹⁸⁸ www.najaco.com, s.v. "Cupping". Islam is a religion which was revealed by Allah (Subhanahu wa Ta'ala) through Prophet Muhammad (Sallallahu 'alaihi wa Sallam) and has been preserved intact in the Holy Quran and the Hadith literature carefully and honestly compiled by different Scholars painstakingly in their books on Traditions, which has been the exclusive property of Muslims for 1400 years. The Muslim community around the world as a whole needed the services of Dr Maurice Bucaille and Dr Keith Moore, one an European and the latter a western scientist to announce to the World that both the Quran and the Hadith literature withstood both scientific scrutiny and the test of time. The Muslim scholars along with scientists should conduct, orient,

2.23 Early embryonic period

The Prophet Muhammad, (SallAllahu ‘alaihi Wasallam), has informed us in a *Hadith* that: “In every one of you, all components of your creation are gathered together in your mothers’ womb by 40 days”.¹⁸⁹ In another *Hadith*, Prophet Muhammad (S.A.W.S) imparts this awakening that when forty-two nights have passed over the drop (nutfah), Allah (Subhānahu wa ‘Ta ‘ālā) sends an angel to it, who shapes it and makes its ears, eyes, skin, flesh and bones. Then he says, “O Lord is it male or female?” and your Lord decides what he wishes.¹⁹⁰

It follows that there is no conflict between genetics and Islam, but in fact *Abadith* can guide science. The first 40 days constitute a clearly distinguishable stage of embryogenesis. This shows the absolute precision and accuracy of these *Abadith* with modern science.

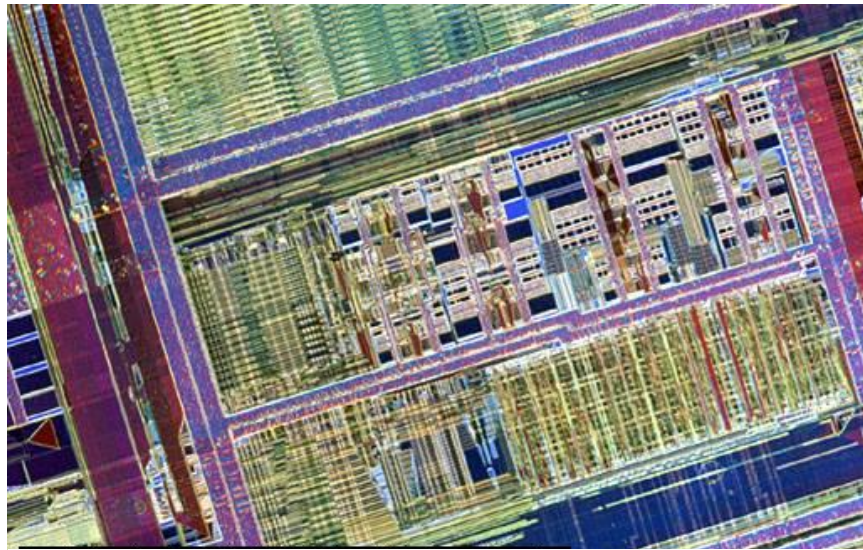
and redouble their efforts on Islamic lines, and try to present Islam in a positive light both to Muslims as well as non-Muslims all over the world.

¹⁸⁹Abu Abdullah Muhammad bin Isma‘il Al-Bukhāri, *op.cit.*, vol.4, Hadith no. 430.

¹⁹⁰Al Hajjaj bin Muslim, *Sabih Muslim*, Riyadh, Saudi Arabia, Daru ibn al Jawzi, 2002, Hadith no.1216.

2.24 Information Technology revolution

The Prophet Muhammad (S.A.W.S), more than 1400 years ago, pronounced number of predictions concerning the day of Judgment, the signs, warnings, and disasters that would occur shortly before the end of times. From these prophecies can easily be inferred that the events occurring every day are not happening by chance, but are a part of the Creator's overall plan. Abu Sa'īd (R.A.) narrates from the Prophet (S.A.W.S): “By Him in Whose hand is my soul, the Hour will not come until wild animals talk to men, and a man speaks to his whip or his shoe, and his thigh will tell him about what happened to his family after he left.”¹⁹¹



IT - Micro-processor used in different processes of communication

¹⁹¹ Abi Abdullah Al Shaibani, *Musnad Al Imam Ahmad bin Hanbal*, Beirut Labnan, Daru Al Ahya' wa Al-Turath, 1993, vol.3, p.504, Hadith no. 11383.

If we analyze the second part of the text of the above *Hadith*, we cannot fail to draw the following conclusions:

There will be unusual ways of communication between people during the end of times. A man will speak into inanimate objects, like a whip or his shoe. His thigh will give him details about his family after he left home.

This *Hadith* clearly talks about futuristic telecommunication devices into which a man speaks, which could be shaped like a whip. It has been noticed that the marketing of smart shoes fitted with tiny micro transmitters that gives precise information about the location and other details of a person. Other futuristic telecommunication devices that are being contemplated are under the skin-implants that have been implanted and successfully tested to monitor wildlife activity. The technologies for such devices already exist in the market and they are for sale. There are people who have used them with astonishing results and it will be only a matter of time before they are made available for public use.¹⁹²

2.25 Cleanliness – Germ infection

The Prophet Muhammad (S.A.W.S) forbade mixing with dogs, and that he warned against their licking plates and against keeping them without necessity. It is narrated by Abu Hurairah (R.A.) that the

¹⁹² www.najaco.com, s.v. "Islam and Science p52"

Prophet Muhammad (S.A.W.S) said at one of the occasions; “If a dog drinks from one of your containers, wash it seven times.”¹⁹³ There is another Hadith to this effect in *Sabih Muslim*, “Cleanse your containers if a dog licks it by washing it seven times, the first washing being with dirt (sand).”¹⁹⁴ From the medical point of view the tapeworm carried by dogs is a cause of chronic disease, sometimes resulting in death. This worm is found in man, in cattle, and in pigs, but it is found in fully-developed form only in dogs, wolves and rarely in cats. These worms differ from others in that they are minute and invisible, consequently, they were not discovered until very recently. Biologically, the developmental process of this worm has some unique characteristics. In the lesions caused by them, one worm gives rise to many heads which spread and form other and varied kinds of lesions and abscesses. These heads develop into full-grown worms only in dogs' tonsils. In humans and in other animals they appear as lesions and abscesses completely different from the tapeworm itself. In animals the size of an abscess may reach that of an apple, while the liver of the infected animal may grow from five to ten times its normal size. In human beings the size of the abscess may reach that of a clenched fist or even the head of an infant; it is filled with yellow fluid weighing from ten to twenty pounds. In the infected human it may cause diverse kinds of inflammations in the lungs, muscles, spleen, kidneys, and brain, and appears in such different forms that

¹⁹³Abu Abdullah Muhammad bin Isma‘il Al-Bukhāri, *op.cit.*, vol.1, Hadith no. 173.

¹⁹⁴Al Hajjaj bin Muslim, *op.cit.*, Hadith no.128.

specialists, until very recently, had difficulty in recognizing it. In any case, wherever this inflammation is found, it poses great danger to the health and life of the patient. What is worse is that, in spite of our knowledge of its life history, origin, and development, we have not been able to devise a cure for it, except that in some instances these parasites die out, possibly because of antibodies produced in the human body. Unfortunately, cases in which such parasites die without causing damage are rare indeed. In any case, wherever this inflammation is found, it poses great danger to the health and life of the patient.¹⁹⁵

The best way to combat the problem is to follow the established principle that prevention is better than cure. Thus human beings can protect themselves from this kind of infection by keep a safe distance from dogs. They should not hug them, play with them, or let them come close to children.

¹⁹⁵ *www.najavo.com, loc.cit.*

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, the Compassionate, the Merciful

CHAPTER 2

CONTRIBUTION OF MUSLIMS IN THE FIELD OF SCIENCE - AN OVERVIEW

(8TH CENTURY TO 13TH CENTURY C.E.)

Ever since Islam was born, Muslims had made immense leaps forward in the area of Science. Cities like Baghdad, Damascus, Cairo and Cordova were great centers of learning civilization. These cities were in a flourishing state with regard to the advancement of knowledge and the Muslim scientists made tremendous progress in applied as well as theoretical Science and Technology. In Europe, however, the situation was much different. Europe was in the Dark Ages. It had no infrastructure or central government. To the Muslims, Europe was backward, unorganized, carried no strategic importance and was essentially irrelevant. Nevertheless the Catholic Church (which at the time was the strongest institution in Europe) successfully convinced Christian Europe that the Muslims were infidels. This caused Europeans to think that Muslims were culturally inferior to Europe and thus Europe was unable to benefit from the new scientific discoveries being made in the Islamic lands before the commencement of 12th century C.E. By doing this Europe kept itself in the Dark Ages while from China to Spain Islamic Civilization prospered. During the Crusade wars there was limited intellectual interaction between Muslims and Christians and the transmission of knowledge to the western world was hampered. As A. Lewis explains, “The Crusaders were men of action, not men

of learning”.¹ The real exchange of ideas, which led to the scientific revolution and to the renaissance, occurred in Muslim Spain.

Cordova was the capital of Muslim Spain. It soon became the center for advanced knowledge and learning for the entire Europe. Scholars and students from various parts of the world and Europe came to Cordova to study. The contrast in intellectual activity is demonstrated best by one example: “In the ninth century, the library of the monastery of St. Gall was the largest in Europe. It boasted 36 volumes. At the same time, that of Cordoba contained over 500,000”²

The idea of the college was a concept which was borrowed from Muslims. The first colleges appeared in the Muslim world in the late 7th century C.E. and early 8th century C.E. In Europe, some of the earliest colleges are those under the University of Paris and Oxford they were founded around the thirteenth century. These early European colleges were also funded by trusts similar those which already existed in the Muslim lands and legal historians have traced them back to the Islamic system. The internal organization of these European colleges was strikingly an imitation of the pattern already in vogue in the Muslim territories, for example the idea of

¹ Macksood Aftab, ‘How Islam Influenced Science’, <http://www.ais.org/~bsb/Herald/Previous/95/science.html>, March 1995.

² *Idem*

Graduate (Sahib) and undergraduate (mutafaqqih) was derived directly from Islamic terms.

It is beyond the scope of the present work to discuss the Muslim contribution in the field of science in detail. We, however, present here the contribution of a selective and limited number of Muslim scientists:

3.1 Jābir ibn Hayyān (776 C.E. – 803 C.E.)

A great personality, the most prominent Arabic chemist; Geber of the middle Ages Abū Musa Jābir ibn Hayyān al-Azdi flourished in Kufa, c. 776 C.E. and died in 803 C.E. He is known as “father of Chemistry”. His recognition rests on his writings on chemistry preserved in Arabic which include; *The Book of the Kingdom*, *The Little Book of the Balances*, *The Book of Concentration*, *The Book of Eastern Mercury* and others.³



Jābir ibn Hayyān

³George Sarton, *Introduction to the History of Science*, edit. by Prof. Hamed A. Ead, www.frcu.eun.eg.

He wrote about a hundred books on Chemistry in which he described the processes of calculation, evaporation, crystallization and sublimation. He modified and corrected the Aristotelian theory of the constituents of metals.⁴ He revised the ancient Greek belief that everything is composed of fire, earth, water, and air. He believed that these four elements combined to form Mercury and Sulphur and that all metals are formed from these two substances when combined in various proportions. Jābir was aware that when Mercury and Sulphur are combined, the red compound cinnabar (Mercuric sulphide) is produced; but he felt that, if the ideal proportion could be found, gold would be the product. This theory was widely adopted; altered and spread; it had great influence on early chemistry and eventually led to the belief in phlogiston.⁵ Jābir deals also with various applications, e.g. refinement of metals, preparation of steel, dyeing of cloth and leather, varnishes to water-proof cloth and protect iron, use of Manganese dioxide in glass making, use of Iron pyrites for writing in gold, distillation of vinegar to concentrate acetic acid. He observed the imponderability of magnetic force.⁶ During the course of these practical endeavours, he also developed *aqua regia*⁷ to dissolve gold.

⁴Prof. Masudul Hasan., *History of Islam*, Delhi, Adam Publishers, 1998, Vol.1, p.664.

⁵*The New Encyclopaedia Britannica*, Chicago USA, Ency. Britannica Inc., 1992, Vol. 6, p. 451.

⁶George Sarton, *op. cit.*, s.v. “Jabir ibn Haiyan”

⁷A fuming, highly corrosive mixture of nitric and hydrochloric acid

The *alembic*⁸ is his great discovery, which made easy and systematic the process of distillation.

Based on their properties he described three distinct types of substances. First, spirits i.e. those which vaporize on heating like camphor, arsenic and ammonium chloride; secondly, metals, for example Gold, Silver, Lead, Copper, Iron and thirdly, the category of compounds which can be converted into powders. He thus paved the way for such later classification as metals, non-metals and volatile substances. His books on chemistry, including his *Kitab al-Kimyā* and *Kitab al-Sab'in* were translated into Latin and various European languages. These translations were popular in Europe for several centuries and have influenced the evolution of modern chemistry. Several technical terms devised by Jābir, such as alkali, are today found in various European languages and have become part of scientific vocabulary. Only a few of his books have been edited and published, while several others preserved in Arabic have yet to be annotated and published. His various breakthroughs e.g. preparation of acids for the first time, notably Nitric acid, Hydrochloric acid, Citric acid and Tartaric acid and emphasis on systematic experimentation are outstanding and it is on the basis of such contribution that he can justly be regarded as the father of modern chemistry.⁹

⁸From Arabic *al-'anbi* "the still," from Greek *ambix* "cup." an apparatus formerly used in distillation .

⁹ Mazhar M. Qureshi, *Introduction to Muslim Contributions to Science and Technology*, New Delhi, Adam Publishers, 2006, p.55.

3.2 Muhammad Ibn Mūsā al-Khwārizmī

(d.840 C.E.)

Abū Abdullah Muhammad Ibn Mūsā al-Khwārizmī was born at Khwārizm (Kheva, Uzbekistan), south of Aral Sea. The accurate dates of his birth and death are not known, but it is established that he flourished under Caliph Al- Ma'mūn at Baghdad through 813-833C.E. and probably died around



al-Khwārizmī

840C.E. Khwārizmī was a mathematician, astronomer and geographer. His works on algebra is outstanding. The very name Algebra has been derived from his famous book *Al Jabr wa al Muqābala*.¹⁰ It contains analytical solutions of linear and quadratic equations. He gave geometrical solutions of quadratic equations for example, $x^2 + 10x = 39$, an equation often repeated by later writers.¹¹ He has the distinction of being the author of the oldest Arabic work

¹⁰*The New Encyclopaedia Britannica*, op. cit., p. 848.

¹¹George, op. cit., s.v. "al-Khwarizmi"

on Mathematics *Kitāb al Jam'a wa al Tafrīq*. He synthesized Greek and Hindu knowledge of mathematical science and also added his own contribution of fundamental importance to Mathematics and Science. Thus, he explained the use of zero,¹² a numeral of fundamental importance. Similarly, he developed the decimal system so that the overall system of numerals, 'algorithm' ('algorizm') is named after him. He developed several arithmetical procedures, operations on fractions, trigonometric tables containing the sine and tangent functions. He also perfected the geometric representation of conic sections and developed the calculus of two errors, which practically led him to the concept of differentiation. He is also reported to have collaborated in the degree measurements.

The contribution of Khwārizmī to geography is also outstanding. He revised and corrected Ptolemy's geographical views along with his map of the world. He prepared a map of the earth in collaboration with a number of scientists. His other contributions include original works related to clocks, sundials and astrolabes. His book on sun-dials was captioned as *Kitāb al-Rukhmat*. In addition, he wrote a book on the Jewish calendar entitled *Istikbraj Tārikh al-Yabūd*. He also wrote *Kitāb al-Tārikh*.

Khwārizmī translated the Indian astronomical tables *Siddhanta*, into Arabic, and wrote a commentary on them.¹³ He compiled his own tables which were an improvement on the Indian tables. He also

¹²K.Phillip Hitti, *History of the Arabs*, New York, St. Martins Press, 1970, p.573.

¹³*The New Encyclopaedia Britannica, loc. cit.*

wrote a treatise on astronomy.¹⁴ Based on his many-sided expertise of higher Mathematics and Astronomy, Khwārizmī produced his book entitled *Kitāb al ʿUnwān al ʿAr...* (*The Shape of the Earth*). He is also the author of the *Keys of Science*, one of which unlocks the theory of music.¹⁵

3.3 Y‘aqub Ibn Isḥāq al-Kindī (b. 800C.E.)

Abū Yūsuf Yaquḥ Ibn Ishaq al-Kindī was born at Kufa around 800 C.E. He was a philosopher, mathematician, physicist, astronomer, geographer and even an expert in music. It is surprising that he made original contribution to all these fields. On account of his work he became known as the philosopher of the Arabs.¹⁶



Ibn Ishaq al-Kindī

¹⁴Prof. Masudul Hasan, *op. cit.*, p.668.

¹⁵Dr. Mohammad R. Mirza and Muhammad Iqbal Siddiqi (ed.), *Muslim Contribution to Science*, Delhi, New Era Publishers, 1997, p. 8.

¹⁶*The New Encyclopaedia Britannica*, *op. cit.*, p. 867.

In Mathematics, he wrote four books on the number system and laid the foundation of a large part of modern Arithmetic. No doubt the Arabic system of numerals was largely developed by al-Khwarizmi, but al-Kindī also made rich contribution to it. He also contributed to spherical geometry to assist him in astronomical studies. In his *Arithmetic* he dealt with the division of fractions, and the extraction of square and cube roots.¹⁷

In Physics, he made rich contribution to geometrical optics and wrote a book on it. This book later on provided guidance and inspiration to such eminent Western scientists as Roger Bacon. He determined specific gravity through hydrostatic balance. He wrote on matter, space, time, and motion. He is rated as “one of the twelve subtlest minds”.¹⁸In Geography, he wrote *Description of the Inhabited Parts of the Earth*. It was one of the earliest books on universal geography.¹⁹

In medicine, his chief contribution comprises the fact that he was the first to systematically determine the doses to be administered of all the drugs known at his time. This resolved the conflicting views prevailing among physicians on the dosage that caused difficulties in writing recipes.

¹⁷Prof. Masudul Hasan. *op. cit.*, vol. 1, p.679.

¹⁸*Ibid.*, p. 663.

¹⁹*Ibid.*, p.639.

In Music he pointed out that the various notes which combine to produce harmony, have a specific pitch each. Thus, notes with too low or too high pitches are non-pleasant. The degree of harmony depends on the frequency of notes, etc. He also pointed out the fact that when a sound is produced, it generates waves in the air which strike the ear-drum. He wrote a number of books on music. The most famous of these books are – *The Essentials of Knowledge on Music* and *On the Melodies*.²⁰ He was a prolific writer. The total number of books written by him is around 241. Out of these 16 deal with Astronomy, 11 with Arithmetic, 32 with Geometry, 22 with Medicine, 12 with Physics, 22 with Philosophy, 9 with Logic, 5 with Psychology and 7 with Music.²¹

3.4 Al-A♣ma'ī (740-828C.E.)

‘Abd al-Malik ibn Quraib al-A♣ma'ī was born in Basrah.²² He is generally regarded as the first Muslim authority on Zoology. He is considered as the first Muslim scientist to have contributed to Zoology, Botany, and Animal Husbandry. He wrote several treatises on the camel, the horse, the sheep and other animals.²³ His famous writings include *Kitāb al-Ibil*, *Kitāb al-Khalil*, *Kitāb al-Wubush*, *Kitāb al-Sha*, and *Kitāb Khalq al-Insān*. The last book on human anatomy

²⁰*Ibid*, p.687.

²¹ www.ummab.net, s.v. “al-kindī”

²² Dr. Mohammad R. Mirza and Muhammad Iqbal Siddiqi, *loc. cit.*

²³ Prof. Masudul Hasan, *op. cit.*, p.665.

demonstrates his considerable knowledge and expertise on the subject.²⁴

Al-Asmaʿī, Iraqi philologist, was collector and editor of ancient Arabic poetry. A leader of the Basra school of philology, he perfected the technique of using Bedouins as informants on the “pure” grammar and vocabulary of the desert. Al-Asmaʿī enjoyed the patronage of the powerful Barmeki family, who brought his work to the notice of the caliph Hārūn al-Rashīd, who employed him as the tutor of his son. After Hārūn’s death, al-Asmaʿī returned to Basra, where he established his own school. Through his disciples, who diligently preserved his lectures and writings, he exercised a dominant influence on later lexicographers. He compiled an anthology, known as *al-Asmaʿiyāt* (edited by W. Ahlwardt in 1902), of 72 pieces of the poets of the jahiliyyah and the early Islamic period. Al-Asmaʿī’s general method was to compose monographs on particular topics, such as names of plants and insects, the horse, the camel, and homonyms, and a considerable number of these monographs have survived.²⁵

3.5 Al-Jāʿiz (d. 869C.E.)

²⁴ Dr. A. Zahoor, “Abd al-Malik ibn al-Quraib al-Asmaʿī”, *www.erols.com*.

²⁵ *Microsoft Encarta Reference Library*, U.S.A., Microsoft Corp., CD Rom. edition, 2003, s.v. “al-Asmaʿī”

Abū Uthmān ‘Amr bin Ba+r al-Jā+iz flourished during the ninth century C.E. He is one of the greatest Arabic writers of all ages. He was the first eminent Arab zoologist of the Muslim world.²⁶ He used to slaughter animals for studying the interior parts of their bodies. He also opened the abdomen of pregnant animals to find out the number of embryos and the location of each one of them in the body.²⁷



al-Jā+iz



His Encyclopaedic work in seven big volumes *Kitāb al-Ḍaywān* (Book of Animals) is the most famous work on zoology, in which he has described in detail the kinds of animals, their behavioural characteristics and their diseases and treatment. This book provides a very constructive contribution on history of natural sciences. The foremost contribution of al-Jā+iz as zoologist in this book was that he has discussed for the first time such mechanisms of biological evolution as struggle for existence, transformation of species and

²⁶Abdul Alī, *Arab Islamic Legacy to Life Science*, Delhi, Idarah Adabiyat, 1993, p.83.

²⁷Dr. Abdul Hamid, *Afaq Islamiyah*, Cairo, p.182.

environmental factors. Illustrating his theory of struggle for existence, he opines that there is a natural war for life between every individual existence and that struggle exists between the members of different as well as the same species.²⁸ He was the first scientist to note changes in birds' lives through migrations. He was also the first scientist to describe the method of obtaining ammonia from the animal offal by distillation.²⁹ He used hydrostatic balance to determine specific gravity.³⁰

As regards the process of transformation of species and mutation, al-Jā+iz holds that it operates in conjunction with the effect of environmental factors like food, climate, shelter, etc., and that the new characteristic thus developed help them survive their environmental conditions in a better way.

Kitāb al-Bayān wa al-Tabyīn (Elegance of Expression and Clarity of Exposition), another long work, treats literary style and the effective use of language. *Kitāb al-Bukhālā'* (Book of Misers) is a collection of stories about the avaricious. Al-Jā+iz, in his works provides an entire education in the humanities of his time.

Although noteworthy for his intellectual freedom, al-Jā+iz often supported government policy in his writings. He was, for example,

²⁸Mehmet Bayrakdar, "Al Jā+iz and the Rise of Biological Evolutionism", *Hamdard Islamicus*, Pakistan, 1985, Vol.VIII, No.2, p.34.

²⁹Prof. Masudul Hasan, *loc.cit.*

³⁰*Ibid.*, p. 663.

part of the rationalist Mu‘tazilite School of theology supported by the caliph al-Māmūn (809-813C.E) and his successor. When Mu‘tazilism was abandoned by caliph al-Mutawakkil, al-Jā‘iz remained in favour of Mu‘tazilites by writing essays such as *Manāqib at-Turk*³¹, a discussion of the military qualities of the Turkish soldiers, on whom government policy depended.³²

3.6 Al-Dīnawarī (d.895C.E.)

Abū Hanīfah al-Dīnawarī deserves special mention. He flourished in ninth century at Dīnawarī in the Persian Iraq.³³

He was one of the early authors who wrote on plants. He was also well-grounded in a variety of subjects such as History, exegesis, Mathematics, Astronomy, Geography, etc. His *Kitāb al Nabāt* (Book of plants) on botany comprising six volumes was massive in size and rich in contents. It covers the classification of plants in general and the morphological structure of individual plants in three groups – plants cultivated for food, fruit bearing plants and wild plants. He described 1120 plants in this work. It is an authentic source of information about the medicinal plants. The author has thrown sufficient light on plant reproduction in clear terms.³⁴ None of al-

³¹ For detail see eng. trans., *Exploits of the Turks*, in Journal of the Royal Asiatic Society, 1915.

³² *The New Encyclopaedia Britannica*, *op.cit.*, p. 472.

³³ Abdul Alī, *op. cit.*, p.92.

³⁴ *Ibid.*, p.93.

Dīnawarī's works on Mathematics is extant. There are, however, fragments of his observations on Astronomy in *Kitāb al-Anwā'*.³⁵

3.7 Thābit Ibn Qurrah (826-901C.E.)

Thābit Ibn Qurrah Ibn Marwan al-Ḥābi al-Ḥarrānī was born at Harran ³⁶ (present Turkey). Thābit contributed to several branches of science, notably Mathematics, Astronomy and Mechanics, in addition to translating a large number of works from Greek to Arabic. He died at Baghdad.³⁷

Thābit's chief contribution lies in Mathematics and Astronomy. He was instrumental in extending the concept of traditional geometry to geometrical algebra and proposed several theories that led to the development of non-Euclidean geometry, spherical trigonometry,



Thābit Ibn Qurrah

integral calculus and real numbers. He criticized a number of theorems of Euclid's elements and proposed important improvements. He applied arithmetical terminology to geometrical quantities, and studied several aspects of conic sections, notably

³⁵*The New Encyclopaedia Britannica, op. cit., Vol. 4, p. 100.*

³⁶Dr. Mohammad R. Mirza and Muhammad Iqbal Siddiqi, *op. cit., p. 177.*

³⁷*The New Encyclopaedia Britannica, op. cit., Vol. 23, p. 572.*

those of parabola and ellipse. A number of his computations aimed at determining the surfaces and volumes of different types of bodies and constitute, in fact, the processes of integral calculus, as developed later.

In Astronomy he was one of the early reformers of Ptolemaic views. He analyzed several problems related to the movement of the sun and the moon and wrote treatises on sun-dials. He propounded the theory of oscillatory motion on the equinoxes.³⁸ In the fields of Mechanics and Physics he may be recognized as the founder of Statics. He examined conditions of equilibrium of bodies, beams and levers. In Medicine he wrote a book on *Anaesthetics*. He dealt with the process of the inducement of anaesthetics by “Tanwim”.³⁹

In addition to translating a large number of books himself, he founded a school of translation and supervised the translation of a further large number of books from Greek to Arabic.

Among Thabit's writings a large number have survived, while several are not extant. Most of the books are on Mathematics, followed by Astronomy and Medicine. The books have been written in Arabic but some are in Syriac. In the Middle Ages, some of his books were translated into Latin by Gherard of Cremona. In recent

³⁸Prof. Masudul Hasan, *op. cit.*, Vol.1, p.669.

³⁹*Ibid.*, p. 673.

centuries, a number of his books have been translated into European languages and published.

He carried further the work of the Banu Musa brothers and later his son and grandson continued this tradition, together with the other members of the group. His original books as well as his translations accomplished in the 9th century C.E. exerted a positive influence on the development of subsequent Scientific Research.⁴⁰

3.8 ‘Alī Ibn Sahl Rabban al-Tabari (838-870C.E.)

Abū al-Hassan ‘Alī ibn
Sahl Rabban al-Tabari

⁴⁰*www.ummah.net*, s.v. “Thābit Ibn Qurrah”



received his education in the disciplines of Medical Science and calligraphy from his able father Sahl and attained perfection in these fields. His exaltation lies in his world-renowned and the earliest Arabic treatise *Firdaus al-Hikmah* (Paradise of Wisdom).⁴¹ Spread over seven parts, it is the first ever Medical Encyclopedia which incorporates all the branches of Medical Science in its folds. Following are the details of its all the seven parts:

1. **Part one:** *Kulliyat al-Tibb*. This part throws light on author's contemporary ideology of medical science. In that era these principles formed the basis of medical science.
2. **Part two:** Explanation of the organs of the human body, rules for keeping good health and comprehensive account of certain muscular diseases.
3. **Part three:** Description of diet to be taken in conditions of health and disease.
4. **Part four:** All diseases right from head to toe. This part is of profound significance in the whole book and comprises twelve papers:
 - i) General causes relating to eruption of diseases.
 - ii) Diseases of the head and the brain.
 - iii) Diseases relating to the eye, nose, ear, mouth and the teeth.
 - iv) Muscular diseases (paralysis and spasm).
 - v) Diseases of the regions of the chest, throat and the lungs.
 - vi) Diseases of the abdomen.
 - vii) Diseases of the liver.
 - viii) Diseases of gallbladder and spleen.
 - ix) Intestinal diseases.

⁴¹Abdul Ali, *op. cit.*, p.58, see also Nayyar Hakīm Wasīfī, *Tibb al 'Arab*, (urdu tran. Of Arabian Medicine, by Edward G. Brownr), Lahore, 1954, p. 52-56.

- x) Different kinds of fever.
 - xi) Miscellaneous diseases- brief explanation of organs of the body.
 - xii) Examination of pulse and urine. This part is the largest in the book and is almost half the size of the whole book.
5. **Part five:** Description of flavour, taste and colour.
6. **Part six:** Drugs and poison.
7. **Part seven:** Deals with diverse topics and discusses climate and Astronomy. Also contains a brief mention of Indian Medicine.⁴²

He has two more compilations to his credit namely *Din al Dūlat* and *Hifz al-Sihhab*.⁴³

3.9 Yuhannah Ibn Masawayh (d.857C.E.)

Masawayh flourished in ninth century.⁴⁴ He was very great ophthalmologist of his time. He procured monkeys from Caliph Must'asim bi Allāh for anatomical dissection. He operated upon them to get more information about the human body.⁴⁵ He wrote the first scientific treatise on ophthalmology under the title *Daghal Al 'ayn* (Disorder of the eye)⁴⁶

⁴²www.ummah.net/history/scholars/index.html, s.v. "al-Tabari"

⁴³ *Idem*

⁴⁴ Abdul Alī, *op.cit.*, p.37.

⁴⁵ *Idem*

⁴⁶ *Ibid.*, p.30. See also George Sarton, *Introduction to the History of Science*, Vol.3, p.574.

3.10 Abū Abdullah Al Battānī (858-929C.E.)

Abū Abdullah Muhammad Ibn Jābir Ibn Sīnān al-Battānī al-Harrani al Sa'bi was in Harran, and according to one account, in Battan, a State of Harran, he died at Samarra.⁴⁷ He is known as the “Ptolemy of the Arabs”.



Abū Abdullah al-Battānī

Battānī was a famous Astronomer, Mathematician and Astrologer. His well-known discovery is the remarkably accurate determination of the solar year as being 365 days, 5 hours, 46 minutes and 24 seconds, which is very close to the latest estimates. He found that the longitude of the sun's apogee had increased by $16^{\circ}, 47'$ since Ptolemy. This implied the important discovery of the motion of the solar apsides and of a slow variation in the equation of time. In contrary to Copernicus, he did not subscribe to the trepidation of the equinoxes.

⁴⁷Dr. Mohammad R. Mirza and Muhammad Iqbal Siddiqi, *op. cit.*, p. 176. See also *The New Encyclopaedia Britannica, op. cit.*, Vol. 28, p. 884.

Al-Battani wrote a treatise entitled *The Science of Stars*.⁴⁸ He determined with remarkable accuracy the obliquity of the ecliptic,⁴⁹ the length of the seasons and the true and mean orbit of the sun. He proved, in sharp contrast to Ptolemy, the variation of the apparent angular diameter of the sun and the possibility of annular eclipses.⁵⁰ He corrected several notions of the orbits of the moon and the planets and propounded a new and very ingenious theory to determine the conditions of visibility of the new moon. His excellent observations of lunar and solar eclipses were used by Dunthorne in 1749 C.E. to determine the circular acceleration of motion of the moon (crescent). He also provided very neat solutions by means of orthographic⁵¹ projection for some problems of spherical trigonometry. In Mathematics, he was the first to replace the use of Greek chords by sines – trigonometric functions, with a clear understanding of their superiority. He also developed the concept of cotangent and furnished their table in degrees.⁵²

3.11 Ibn Kathir al-Farghani (b. 860 C.E.)

⁴⁸Prof. Masudul Hasan, *op. cit.*, Vol.1, p.669.

⁴⁹Obliquity of ecliptic is the angle between the planes of the earth's equator and orbit.

⁵⁰*The New Encyclopaedia Britannica*, *op. cit.*, Vol. 28, p. 884. Also annular eclipse is a solar eclipse in which all but the outermost rim of the sun is blocked by the moon, leaving a ring of sunlight visible around the moon.

⁵¹Graph composed of vertical lines.

⁵²www.ummah.net/history/scholars/index.html, s.v. "Abū Abdullah Al-Battani"

Abū'l-Abbas Ahmad ibn Muhammad ibn Kathir al-Farghani, born at Farghana, Transoxiana, was one of the most distinguished astronomers of his period. He wrote *Kitāb fi al-Harakat al-Samawiya wa Jawami 'Ilm al-Nujūm* (i.e. The Book on celestial motion and thorough science of the stars) or “Elements of Astronomy.”⁵³ It is his best-known and most influential work. He determined the diameter of the earth to be 6,500 miles.⁵⁴

Ibn al-Nadim in his *al-Fibris*, written in 987C.E. ascribes only two works to Al-Farghani: (1) *Kitāb al-Fusul, Ikhtiyar al-Majisti* (The Book of Chapters, a summary of the Almagest) and (2) *Kitāb 'Amal al-Rukhamat* (Book on the Construction of Sun-dials).⁵⁵



Abd al-Aziz al-Qabisi (d.967C.E.) wrote a commentary on Farghani's *Jawami*, which is preserved in the Istanbul manuscript, Aya Sofya 4832, fols. 97v-114v. Two Latin translations followed in the 12th century. Jacob

⁵³Prof. Masudul Hasan, *op. cit.*, Vol., p.669.

⁵⁴www.ummah.net/history/scholars/index.html, s.v. “al-Farghani”

⁵⁵*Idem*

Anatoli produced a Hebrew translation of the book that served as a basis for a third Latin version, appearing in 1590C.E. whereas Jacob Golius published a new Latin text together with the Arabic original in 1669C.E. The influence of 'The Elements' on mediaeval Europe is clearly vindicated by the presence of innumerable Latin manuscripts in European libraries.

Many medieval writers have referred to this book. There is no denying the fact that this book made a significant contribution towards the diffusion of knowledge related Ptolemaic astronomy, at least until this role was taken over by Sacrobosco's *Sphere*. But even then, 'The Elements' of Al-Farghani continued to be used, and Sacrobosco's *Sphere* was evidently indebted to it. It was from 'The Elements' (in Gherard's translation) that Dante derived the astronomical knowledge displayed in the 'Vita nuova' and in the 'Convivio'.⁵⁶

3.12 Muhammad Ibn Zakariyya al-Rāzī

(865-932 C.E.)

Ab[▲] Bakr Mohammad Ibn Zakariyya al-Rāzī was born at Ray.⁵⁷ He was a

⁵⁶ *Idem*

⁵⁷ *The New Encyclopaedia Britannica, op. cit., Vol. 9, p. 967.*



Ibn Zakariyya al-Rāzī

prolific author, who has more than 200 outstanding scientific contributions to his credit, out of which about half deal with Medicine and 21 deal with Alchemy.

Rāzī was an alchemist and a philosopher. Some of his works in medicine e.g. *Kitāb al-Manṣūrī*, *Al-Hāwī*, *Kitāb al-Mulūkī* and *Kitāb al-Judari wa al-Hasabah* earned everlasting fame. His *al-Judari wa al-Hasabah* was the first treatise on smallpox and chicken-pox, and is largely based on Razi's original contribution. Through this treatise he became the first to draw clear comparisons between smallpox and chicken-pox. His *Kitāb al-Manṣūrī* is based largely on Greek science, and finally his famous monograph on smallpox and measles.⁵⁸ *Al-Hawī* was the largest medical Encyclopaedia composed by then. It contained on each medical subject all important information that was available from Greek and Arab sources, and this was concluded by him by giving his own remarks based on his experience and views.⁵⁹ A special feature of his medical system was that he greatly favoured cure through correct and regulated food. This was combined with his emphasis on the influence of psychological factors on health. He also tried and proposed remedies first on animals in order to evaluate the effects and side effects. He was also an expert surgeon and was the first to use opium for anaesthesia. He has portrayed in great detail several

⁵⁸George Sarton, *op. cit.*, s.v. "al-Razi"

⁵⁹*The New Encyclopaedia Britannica, op. cit.*, p. 968.

chemical reactions and also given full descriptions of and designs for about twenty instruments used in chemical investigations. His description of chemical knowledge is in plain and plausible language. One of his books called *Kitāb al-Asrār* deals with the preparation of chemical materials and their utilization. He divided substances into plants, animals and minerals, thus in a way opening the way for inorganic and organic chemistry. As a chemist, he was the first to produce Sulphuric acid together with some other acids, and he also prepared alcohol by fermenting sweet products.⁶⁰

He also wrote on Physics, Mathematics, Astronomy and Optics. He made investigations on specific gravity by means of the hydrostatic balance, which he called *al-mizān al-tabī'i*.⁶¹ His other books include *Jami-fī-al-Tibb*, *Maqalah fī al-Hasat fī Kulī wa al-Mathana*, *Kitāb al-Qalb*, *Kitāb al-Mafāsīl*, *Kitāb-al-'Ulaj al-Ghuraba*, *Bar al-Sa'ah*, and *al-Taqsīm wa al-Takhsīr*.

3.13 Ibn Waḥshīyyh (d. 960 C. E.)

Ibn Waḥshīyyh, Abū Bakar Ahmad bin 'Alī flourished during the tenth century. He was well known for his knowledge in Alchemy and Botany.⁶²

⁶⁰www.imase.org/scientists.php, s.v. "al-Razi"

⁶¹George Sarton, *Op. cit.*, s.v. "al-Razi"

⁶²*Ibid.*, s.v. "ibn Wahshiyh"

Ibn Waṣṣhīyyh wrote his celebrated work *Al Fillāḥ al Nabatīyah* (The Nabatean Agriculture) containing very valuable information about plants.⁶³ As described by Ibn Waṣṣhīyyh, in the preface of the book, it is based on an old Nabatean text on agriculture. It covers, besides agriculture and botany, the idolatrous beliefs of the Nabateans and the Arameans. This voluminous book contains valuable information on almost all the matters relating to agriculture. For example, one chapter is devoted to the discussion of the properties of the olive, while another independent chapter deals with the science of choosing suitable places for digging wells in order to produce large quantities of water for the purpose of irrigation. The method of cultivation of various crops, fruit bearing plants and vegetables as well as those of fighting the diseases and calamities that befall standing crops and plants have been dealt with under separate chapters.⁶⁴ This book really contains functional information on the practical agricultural science.

3.14 Al-Fārābī (870-950 C.E.)

Abū Nasr
Muhammad Ibn
al-Farakh al-Fārābī
was born in a small



⁶³Prof. Masudul Hasan. *op. cit.*, vol. 1, p.665.

⁶⁴Abdul Alī, *op. cit.*, p.94.

village Wasij, near Fārāb in Turkistan. He died a bachelor in Damascus⁶⁵ at the age of 80 years.

Fārābī contributed considerably to science, Philosophy, Logic, Sociology, Medicine, Mathematics and Music. His 117 books are known, out of which 43 are on Logic, 11 on Metaphysics, 7 on ethics, 7 on Political Science, 17 on Music, Medicine and Sociology, while 11 are commentaries. Some of his more famous books include the book *Fusus al-Hikam*, which remained a text book of philosophy for several centuries at various centres of learning and is still taught at some of the institutions in the East. The book *Kitāb al-lhsa al'Ulum* discusses classification and fundamental principles of science in a unique and useful manner. The book *Ara Ahl al-Madina al-Fadila* (The Model City) is a significant early contribution to Sociology and Political Science.⁶⁶

3.15 Abū al Hassan ‘Alī al-Masu‘di(d.975C.E.)

Abū al-Hassan ‘Alī ibn Hussain ibn al-Masu‘di was a descendent of Abdullah ibn Masu‘d, a companion of the Prophet Muhammad

⁶⁵*The New Encyclopaedia Britannica, op. cit., Vol 4, p. 680.*

⁶⁶ *www.ummah.net, op. cit., s.v. “al-Farabi”*



al-Masu‘di

(S.A.W.S). An expert Geographer, a Physicist and Historian Masu'di was born in the last decade of the 9th century C.E. He was a Mutazilite Arab, who explored distant lands and died at Cairo.

He travelled to Fars in 915 C.E. and after staying for one year in Istikhar, he proceeded via Baghdad to India where he visited Multan and Mansoorra before returning to Fars. From there he traveled to Kirman and then again to India. Mansoorra in those days was a city of great renown and was the capital of the Muslim state of Sindh. Around it, there were many settlements of new converts to Islam. In 918 C.E. Masu'di travelled to Gujrat where more than 10,000 Arab Muslims had settled in the sea-port of Chamoor. He also traveled to Deccan, Ceylon, Indo-China and China and proceeded via Madagascar, Zanjibar and Oman to Basra.

At Basra he completed his book *Muruj al-dhahab* in which he described, in a most absorbing manner, his experience of various countries, peoples and climates. He gives accounts of his personal contacts with the Jews, Iranians, Indians and Christians. From Basra he moved to Syria and from there to Cairo where he wrote his second extensive book *Muruj al-Zaman* in thirty volumes. In this book he described in detail the Geography and history of countries that he had visited. His first book was completed in 947 C.E. He also prepared a supplement called *Kitab al-Ausat*, in which he compiled historical events chronologically. In 957 C.E., the year of his death, he completed his last book *Kitab al-Tanbih wa al-Ishraf*, in

which he has given a summary of his earlier book as well as an errata.

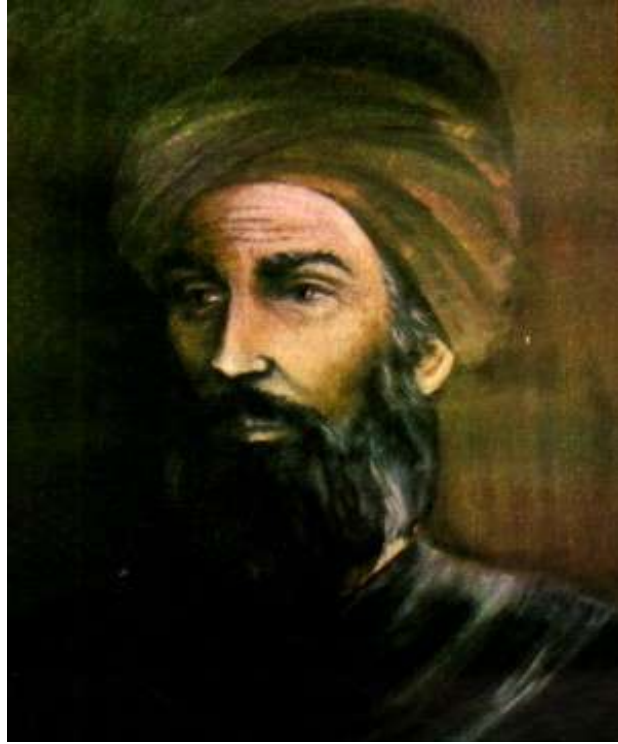
Masu'di is referred to as the Herodotus and Pliny of the Arab. By presenting a critical account of historical events, he initiated a change in the art of historical writing, introducing the elements of analysis, reflection and criticism, which were later on further improved by ibn Khaldun. In particular, in *Al-Tanbih* he makes a systematic study of history against a perspective of geography, sociology, anthropology and ecology. Masu'di had a deep insight into the cause of rise and fall of nations. With his scientific and analytical approach, he has given an account of the cause of the earthquake of 955 C.E., as well as the discussion of the water of the Red Sea and other problems in the earth science. He is the first author to make mention of windmills which were discovered by Muslims of Sijistan. He also made important contribution to music and other fields of science. In his book *Muruj al-Dhabab* he provides important information on early Arab music as well as music of other countries. His book *Muruj al-Dhabab wa al-Ma'adin al-Jawahir* (Meadows of Gold and Mines of Precious Stones) has been held as 'remarkable' because of the catholicity of its author who neglected no source of information and of his truly scientific curiosity.⁶⁷

⁶⁷Mazhar M. Qureshi, *op.cit.*, p.59-60.

3.16 Abū al-Qāsim al-Zahrāwī(936-1013C.E.)

Abū al-Qāsim Khalaf ibn al-Abbas al-Zahrāwī, honoured in the West as Abūlcasis, was born at Zahra in the neighbourhood of Cordova.⁶⁸

He is best known for his early and original breakthroughs in surgery as well as for his famous Medical



al-Zahrāwī

Eyclopaedia called *al-Tasrif li Man'ajaz'an al-ta'ālīf* (an aid to him who lacks the capacity to read big books)⁶⁹ which is composed of thirty volumes covering different aspects of medical science. The more important part of this series comprises three books on surgery, which describe in detail various aspects of surgical treatment as based on the operations performed by him, including cauterization, removal of stone from the bladder, dissection of animals, midwifery,

⁶⁸Dr. Mohammad R. Mirza Muhammad Iqbal Siddiqi, *op.cit.*, p. 11.

⁶⁹*Mass News Letter*, Aligarh, Muslim Association for the Advancement of Science, 1997, Vol.10, No.6, p.2.

stypics, and surgery of eye, ear and throat. He performed several delicate operations, including removal of the dead foetus and amputation.

Al-Zahrawi was the inventor of several surgical instruments, of which three are notable:

- (i) An instrument for internal examination of the ear.
- (ii) An instrument for internal inspection of the urethra.
- (iii) An instrument for applying or removing foreign bodies from the throat. He specialized in curing disease by cauterization and applied the technique to as many as 50 different operations.⁷⁰

In his book *al-Tasrif*, al-Zahrawi has also discussed the preparation of various medicines, in addition to a comprehensive account of surgical treatment in specialized branches, whose modern counterparts are E.N.T., Ophthalmology, etc. In connection with the preparation of medicines, he also described in detail the application of such techniques as sublimation and decantation. Al-Zahrawi was also an expert in dentistry, and his book contains sketches of various instruments used thereof, in addition to a description of various important dental operations. He discussed the problem of non-aligned or deformed teeth and how to

⁷⁰Abdul Alī, *op. cit.*, p.45-46.

rectify these defects. He developed the technique of preparing artificial teeth and of replacement of defective teeth by these. In Medicine, he was the first to describe in detail the unusual disease, hemophilia.⁷¹

3.17 Ibn Ismā‘īl al-Būzjānī (940-998 C.E.)

Abū al-Wafā’
Muhammad Ibn
Muhammad Ibn
Ya+yā Ibn Ismā‘īl al-
Būzjānī was born in
Buzjan, Nishapur.
He flourished as a
great Mathematician
and Astronomer at
Baghdad.⁷²

Abū al-Wafa's
main contribution
lies in several
branches of



al-Būziānī

⁷¹*www.ummah.net, op. cit., s.v. "al-Zahrawī"*

⁷²*The New Encyclopaedia Britannica, op. cit., Vol. 1, p. 44.*

mathematics, especially geometry and trigonometry. In geometry his contribution comprises solution of geometrical problems with opening of the compass; construction of a square equivalent to other squares; regular polyhedra; construction of regular heptagon taking for its side half the side of the equilateral triangle inscribed in the same circle; constructions of parabola by points and geometrical solution of the equations:

$$x^4 = a \text{ and } x^4 + ax^3 = b$$

Abū al-Wafa's contribution to the development of trigonometry was extensive. He was the first to show the generality of the sine theorem relative to spherical triangles. He developed a new method of constructing sine tables, the value of $\sin 30'$ being correct to the eighth decimal place. He also developed relations for $\sin(a+b)$ and the formula:

$$2 \sin^2(a/2) = 1 - \cos a, \text{ and}$$

$$\sin a = 2 \sin(a/2) \cos(a/2)^{73}$$

He translated and wrote commentaries on the works of the Greek mathematicians Euclid and Diophantus of Alexandria and the Arabic mathematician al-Khwārizmī. He also wrote two (extant) works aimed at the practical user, *Kitāb fī mā Yahtaj ilayhi al-Kuttāb wa'l-Ummāl min 'ilm al-Ḥisāb* (Book on What is Necessary from the

⁷³*www.ummah.net, op. cit., s.v. "al-Buzjani"*

Science of Arithmetic for Scribes and Businessmen) and *Kitāb fī mā Yaḥtāj Ilayhi al-ʿĀnī‘min al-ʿMāl al-Ḥandasiyya* (Book on What Is Necessary from Geometric Constructions for the Artisan).⁷⁴

3.18 Ibn al-Haytham(965-1039 C.E.)

Abū ‘Alī Hasan Ibn al-Haytham was one of the most eminent physicists, whose contributions to Optics and the scientific methods are outstanding. Known in the West as Alhazen, Ibn al-Haytham was born at Basrah and died in Egypt.⁷⁵



Ibn al-Haytham

Ibn al-Haytham's most important work is *Kitāb al-Manāẓir* (Optics). Although it shows some influence from Ptolemy's 2nd century C.E. Optics, it contains the correct model of vision: the passive reception by the eyes of light rays reflected from objects, not

⁷⁴*The New Encyclopaedia Britannica, loc. cit.*

⁷⁵Muhammad Saud, *The Scientific Methods of Ibn Al Haytham*, Delhi, Adam Publishers, 1995, p.1.

an active emanation of light rays from the eyes. It combines experiment with mathematical reasoning, even if it is generally used for validation rather than discovery. The work contains a complete formulation of the laws of reflection and a detailed investigation of refraction, including experiments involving angles of incidence and deviation. Refraction is correctly explained by light's moving slower in denser mediums. The work also contains “Alhazen's problem”—to determine the point of reflection from a plane or curved surface, given the centre of the eye and the observed point—which is stated and solved by means of conic sections. Other optical works include *ʿĀw’ al-Qamar* (On the Light of the Moon), *al-Halā wa-qaws Quṣṣa* (On the Halo and the Rainbow), *ʿĀrat al-Kusaf* (On the Shape of the Eclipse; which includes a discussion of the camera obscura), and *al-ʿĀw’* (A Discourse on Light). In his *Ḍall Shukūk fī Kitāb ʿUqlīdis* (Solution of the Difficulties of Euclid's Elements) Ibn al-Haytham investigated particular cases of Euclid's theorems, offered alternative constructions, and replaced some indirect proofs by direct proofs. He made an extended study of parallel lines in *Sharḥ Muʿādarāt Kitāb Uqlīdis* (“Commentary on the Premises of Euclid's Elements”) and based his treatment of parallels on equidistant lines rather than Euclid's definition of lines that never meet. His *Maqāla fī Tamām Kitāb al-Makbrūʿāt* (Completion of the Conics) is an attempt to reconstruct the lost eighth book of Apollonius's Conics (c. 200 BC). Among his other mathematical works are treatises on the area of crescent-shaped

figures and on the volume of a paraboloid of revolution (formed by rotating a parabola about its axis).

Ibn al-Haytham's most famous astronomical work is *Hay'at al-'Ālam* (On the Configuration of the World), in which he presents a nontechnical description of how the abstract mathematical models of Ptolemy's *Almagest* can be understood according to the natural philosophy of his time. While this early work implicitly accepts Ptolemy's models, a later work, *al-Shukūk 'alā Baḥāmīyūs* (Doubts about Ptolemy), criticizes the *Almagest*, along with Ptolemy's *Planetary Hypotheses* and *Optics*.⁷⁶

In his book *Mizān al-Hikmah* Ibn al-Haytham has discussed the density of the atmosphere and developed a relation between it and the altitude. He also studied atmospheric refraction. He discovered that the twilight only ceases or begins when the sun is 19° below the horizon and attempted to measure the height of the atmosphere on that basis. He discussed the theories of attraction between masses, and it seems that he was aware of the magnitude of acceleration due to gravity.⁷⁷

The above contribution of Ibn al-Haytham indicates clear development of the scientific methodology which is distinct from guess and gesture, and placed scientific pursuits on a sound

⁷⁶*The New Encyclopaedia Britannica, op. cit.*, Vol.23, pp.2, 572.

⁷⁷*www.ummah.net, op. cit.*, s.v. "al-Haytham"

foundation comprising systematic relationship between observation, hypothesis and verification.

3.18 Abū Rayḫān al-Bīrūnī(973-1048 C.E.)

Abū Rayḫān Muhammad Ibn Ahmad al-Bīrūnī was a versatile scholar and scientist who had equal competence in Physics, Metaphysics, Mathematics, Geography and History. Born in the city of Kheva near Ural and he died at the age of seventy five only.⁷⁸



al-Bīrūnī

Al-Bīrūnī wrote his famous book *al-Qānūn al-Mas'ūdī fi al-Hai'a wa al-Nujum*, which discusses several theories of astronomy, trigonometry, solar, lunar, and planetary motions and related topics. In another well-known book *al-Āthār al-Bāqiyah* (chronology of ancient nations), he has attempted a chronological account of ancient history of nations and the related geographical knowledge. In this book, he has discussed

⁷⁸*The New Encyclopaedia Britannica, op. cit., Vol. 2, p. 237.*

the rotation of the earth and has given correct values of latitudes and longitudes of various places. He has also made considerable contribution to several aspects of physical and economic geography in this book. His other scientific contributions include the accurate determination of the densities of 18 different stones. He also wrote the *Kitāb-al-Saydalah*, which is an extensive materia medica that combines the then existing Arabic knowledge on the subject with the Indian medicine. His book *Kitāb-al-Jamāhir fī Ma'rifat al-Jawābir* deals with the properties of various precious stones.⁷⁹

He developed a method for trisection of angle and other problems which cannot be solved with a ruler and a compass alone. Al-Bīrūnī discussed, centuries before the rest of the world, the question whether the earth rotates around its axis or not. He ascertained that as compared with the speed of sound the speed of light is immense.⁸⁰ He explained the working of natural springs and artesian wells by the hydrostatic principle of communicating vessels.⁸¹ His investigations included description of various monstrosities, including that known as "Siamese" twins.⁸² He observed that flowers have 3,4,5,6, or 18 petals, but never 7 or 9.⁸³

⁷⁹ *LAS News Letter*, Amman Jordan, Islamic World Academy of Science, 2007, vol.21, no. 35, p.8.

⁸⁰ Muhammad Saud, *Islam And Evolution of Science*, Delhi, Adam Publishers, 1994, p. 41.

⁸¹ *Ibid.*, p.38.

⁸² *LAS News Letter*, *loc.cit.*

⁸³ Muhammad Saud, *op. cit.*, p.96. See also George Sarton, *Introduction to History of Science*, Vol. 1, Washinting, 1956, p.707.

Al-Bīrūnī recorded observations of his travels through India in his well-known book *Kitāb al-Hind* which gives a graphic account of the historical and social conditions of the sub-continent. At the end of this book he makes a mention of having translated two Sanskrit books into Arabic, one called *Sakaya*, which deals with the creation of things and their types, and the second, *Patanjal* dealing with what happens after the spirit leaves the body.⁸⁴

He wrote a number of books and treatises. Apart from *Kitāb al-Hind* (History and Geography of India), *al-Qānūn al-Mas'ūdī* (Astronomy, Trigonometry), *al-Āthār al-Bāqiyah* (chronology of ancient nations), *Kitāb-al-Saydalab* (Materia Medica) and *Kitāb-al-Jamāhir* (Precious Stones) as mentioned above, his book *al-Tafhimli-Avail Sina'at al-Tanjim* gives a summary of Mathematics and Astronomy.

He considered as one of the very greatest Muslim. His critical spirit, love of truth and scientific approach were combined with a sense of toleration. His enthusiasm for knowledge may be judged from his claim that the phrase Allah is Omniscient does not justify ignorance.⁸⁵

⁸⁴Mazhar M. Qureshi, *op. cit.*, p.65.

⁸⁵*Ibid.*, p.66.

3.19 Abū Alī al-Husain Ibn ‘Abdallah Ibn Sīnā (980-1037 C.E.)

Abū Alī al-Husain Ibn ‘Abdallah Ibn Sīnā was born in the village of Afshana near Bukhāra. He died at Hamadan. He was known as “The Prince of Physicians”.⁸⁶

He was the most famous Physician, Philosopher, Encyclopedist, Mathematician and Astronomer of his time. His major



contribution to medical science is his famous book *al-Qānūn*, known as the "Canon" in the West. The *Qānūn fī al-Tibb* is a massive encyclopedia of medicine extending over a million words. It surveyed the entire medical knowledge available from ancient and Muslim sources. Due to its systematic approach, formal perfection as well as its intrinsic value, the *Qānūn* remained supreme for six centuries. In addition to bringing together the then available

⁸⁶Prof. Masudul Hasan, *op. cit.*, p. 675.

knowledge, the book is rich with the author's original contribution. His important original contribution includes such advances as recognition of the contagious nature of phthisis and tuberculosis; distribution of diseases by water and soil, and interaction between psychology and health. In addition to describing pharmacological methods, the book described 760 drugs and became the most authentic materia medica of the era. He was also the first to describe meningitis and made rich contributions to Anatomy, Gynaecology and child health. His philosophical encyclopaedia *Kitāb al-Shifa* was a monumental work, embodying a vast field of knowledge from philosophy to science. He classified the entire field as follows:

1. Theoretical knowledge: - Physics, Mathematics and Metaphysics
2. Practical knowledge: - Ethics, Economics and Politics.

His philosophy synthesizes Aristotelian tradition, Neoplatonic influences and Muslim theology.⁸⁷

In Physics, his contribution comprised the study of different forms of energy, heat, and light and such concepts as force, vacuum and infinity. He made the important observation that if the perception of light is due to the emission of some sort of particles by the luminous source, the speed of light must be finite.⁸⁸

⁸⁷Muhammad Saud, *op. cit.*, p. 85-88.

⁸⁸*The Encyclopaedia of Religion and Ethics*, Edinburgh, 1953, Vol. 11, p. 274.

In Mathematics, he explained the "casting out of nines" and its application to the verification of squares and cubes. He made several astronomical observations, and devised a contrivance similar to the vernier, to increase the precision of instrumental readings.

In the field of Chemistry, he did not believe in the possibility of chemical transmutation because, in his opinion, the metals differed in a fundamental sense. These views were radically opposed to those prevailing at the time.

In the field of Music, his contribution was an improvement over Farabi's work and was far ahead of knowledge prevailing elsewhere on the subject. Doubling with the fourth and fifth was a 'great' step towards the harmonic system and doubling with the third seems to have also been allowed. Ibn Sina observed that in the series of consonances represented by $(n + 1)/n$, the ear is unable to distinguish them when $n = 45$. His treatise on minerals was one of the "main" sources of Geology of the Christian encyclopaedists of the thirteenth century. Besides *Shifa* his well-known treatises in philosophy are *al-Najat* and *Isharat*.⁸⁹

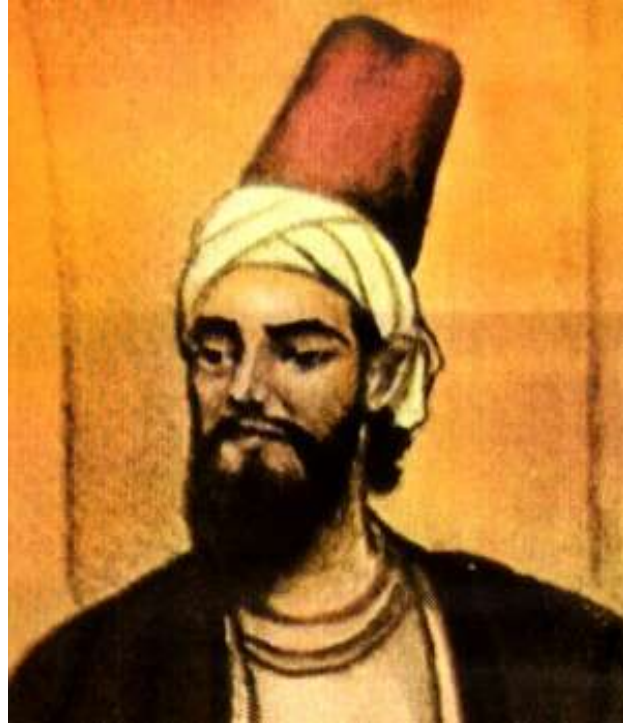
3.20 ‘Umar al-Khayyām (1044-1124 C.E.)

Ghayath al-Din Abūl Fatah ‘Umar Ibn Ibrahim al-Khayyām was born at Nishapur, the provincial capital of Khurasan and died

⁸⁹Mazhar M. Qureshi, *op. cit.*, p.63.

also at Nishapur. He was one of the most reputed Mathematician, Astronomer, Philosopher, Physician and Poet of his times.⁹⁰

In the field of Algebra, he made an attempt to classify most algebraic equations, including the third degree equations and, in fact, offered solutions for a number of them. This includes geometric solutions of cubic



equations and partial geometric solutions of most other equations. His book *Maqalat fi al-Jabr wa al-Muqabila* is a master-piece on Algebra. His remarkable classification of equations is based on the complexity of the equations, as the higher the degree of an equation, the more terms, or combinations of terms, it will contain. Thus, Khayyām recognizes 13 different forms of cubic equation. His method of solving equations is largely geometrical and depends upon an ingenious selection of proper conics. He also developed the binomial expansion when the exponent is a positive integer. In fact, he has been considered to be the first to find the binomial theorem

⁹⁰*www.ummah.net, op. cit., s.v. "al-Khayyam"*

and determine binomial coefficients. In geometry, he studied generalities of Euclid and contributed to the theory of parallel lines. Khayyām introduced a calendar that was remarkably accurate, and was named as *al-Tarikh-al-Jalali*. It had an error of one day in 3770 years and was thus even superior to the Georgian calendar (error of 1 day in 3330 years). In Metaphysics, he wrote three books including *Risala Dar Wujud* and the recently discovered *Nauruz- namah*.⁹¹

3.21 Abū Marwan Ibn Zuhr (1161-1162 C.E.)

⁹¹*Idem*

Abū Marwan Abd al-Malik Ibn Zuhr was born at Seville and died in Seville.⁹²

Ibn Zuhr was one of the greatest physicians and clinicians of the Muslim golden era. As a physician, he made several discoveries and breakthroughs. He described correctly, for the first time,



scabies, the itch mite and may thus be regarded as the first parasitologist. Likewise, he prescribed tracheotomy and direct feeding through the gullet and rectum in the cases where normal feeding was not possible. He also gave clinical descriptions of mediastinal tumours, intestinal phthisis, inflammation of the middle ear, pericarditis, etc. *Kitāb al-Taisir fī al-Mudawat wa al-Tadbir* (Book of Simplification concerning Therapeutics and Diet), is the most important work of Ibn Zuhr. It describes several of Ibn Zuhr's original contributions. The book gives in detail pathological

⁹²Cyril Glasse, *The Concise Encyclopaedia of Islam*, London, 1989, p. 177. See also George Sarton., *Introduction to the History of Science*, edit. by Prof. Hamed A. Ead, www.frcu.eun.eg.

conditions, followed by therapy. His *Kitāb al-Iqtisad fi Islah al-Anfus wa al-Ajsād* (Book of the Middle Course concerning the Reformation of Souls and the Bodies) gives a summary of diseases, therapeutics and hygiene, written specially for the benefit of the layman. Its initial part is a valuable discourse on Psychology. *Kitāb al-Aghthiya* (Book on Foodstuffs) describes different types of food and Medicines and their effects on health.⁹³

3.22 Al-Idrīsī (1099-1180 C.E.)

Abū ‘Abd Allah Muhammad Ibn Muhammad Ibn ‘Abd Allah Ibn Idris al-Qurtubi al-Hasani, was born in Ceuta, Spain and educated at Cordova.⁹⁴

His major contribution lies in medicinal plants as presented in his several



Al-Idrīsī

books, especially *Kitāb al-Jāmi‘-li-Siffāt Ashtāt al-Nabatāt*. He collected

⁹³*www.ummab.net, op. cit.*, s.v. “al-Zuhr”

⁹⁴Cyril Glasse, *op. cit.*, p. 180.

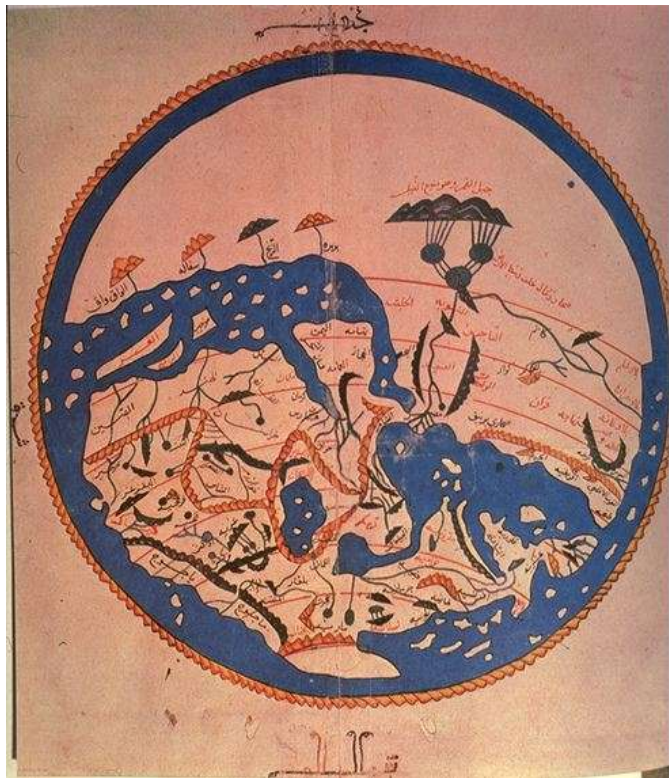
plants and data not reported earlier and added this to the subject of botany, with special reference to medicinal plants. Thus, a large number of new plants with significant medical values together with their evaluation became available to the practitioners. He has given the names of the drugs in six languages: Syriac, Greek, Persian, Hindi, Latin and Berber.⁹⁵

He described the world in *Al-Kitāb al-Rujari*⁹⁶ (Roger's Book), also entitled *Nuzhat al-Mushtaq fi Ikhtiraq al-ʿafaq* (The delight of him who desires to journey through the climates). This is practically a geographical encyclopedia of the time, containing information not only on Asia and Africa, but also Western countries. The later Muslim geographers derived information on Western countries from this celebrated work. This work contains seventy-one maps. Of these, a round world map is given in the beginning of the book and the remaining seventy in the middle of it. Each map represents a tenth part of one of the seven climes in which the world was divided by Ptolemy. These climes are the latitudinal lands which lie to the north of the equator and are divided by lines of longitude into ten parts. In his text al-Idrīsī gathers, in an orderly fashion, the historical, geographical and miscellaneous material relating to the description of one of these seventy maps. Al-Idrīsī got a map engraved by the artisans on around base made of silver. It was the

⁹⁵ *LAS News Letter*, Amman Jordan, Islamic World Academy of Science, 2006, vol.20, no.33, p.8.

⁹⁶Cyril Glasse, *loc.cit.*

result of the co-operative efforts of the scholars who worked for about fifteen years on collecting material on the then known world. This material was collected from the envoys of the king, from the entire available geographical treatise and from other sources of information. The maps given in this book show that the author accepted the sphericity of the earth. Among the remarkable features of these maps is the location of the exact sources of the Nile, which is wrongly considered to be a discovery of the 9th century C.E.⁹⁷ He also compiled another



al-Idrisī's world map

geographical encyclopaedia, larger than the former entitled *Rawd al-nas wa-Nuzhat al-Naffs* also known as *Kitāb al-Mamalik wa al-Masalik*.⁹⁸

⁹⁷Muhammad Saud, *op.cit.*, pp. 107-108. Also George Sarton, *op. cit.*, p.410.

⁹⁸*www.ummah.net, op. cit.*, s.v. "al-Idrisī"

3.23 Ibn Rushd (1126-1198 C.E.)

Abū al-Walīd
Muhammad Ibn
Ahmad Ibn
Muhammad Ibn
Rushd, known as
Averroes in the
West, was born in
Cordova.⁹⁹ He
died in 1198
C.E.¹⁰⁰



Ibn Rushd

Ibn Rushd made remarkable contribution to Philosophy, Logic, Medicine, Music and Jurisprudence. In medicine his well-known book *Kitāb al-Kulyat fī al-Tibb* was written before 1162 C.E. Its Latin translation was known as 'Colliget'. In this work, Ibn Rushd throws light on various aspects of Medicine, including the diagnoses, cure and prevention of diseases.¹⁰¹ The book concentrates on specific areas in comparison of Ibn Sīnā's wider scope of *al-Qānūn*, but contains several original observations of Ibn Rushd.

⁹⁹M.M.Sharif, *A history of Muslim Philosophers*, Delhi, Adam Publishers, 2001, Vol. 1, p. 540.

¹⁰⁰Cyril Glasse, *op. cit.*, p. 174.

¹⁰¹M.M.Sharif, *op. cit.*, p. 543.

He wrote three commentaries on the works of Aristotle, as these were known then through Arabic translations. The shortest *Jami* may be considered as a summary of the subject. The intermediate was *Talkhis* and the longest was the *Tafsir*. These three commentaries would seem to correspond to different stages in the education of pupils; the short one was meant for the beginners, then the intermediate for the students familiar with the subject, and finally the longest one for advanced studies. The longest commentary was, in fact, an original contribution as it was largely based on his analysis including interpretation of Qur'ānic concepts. In philosophy, his most important work *Tuhafut al-Tuhafut* was written in response to al-Ghazzālī's work *Tuhafut al-Falasfah*.¹⁰²

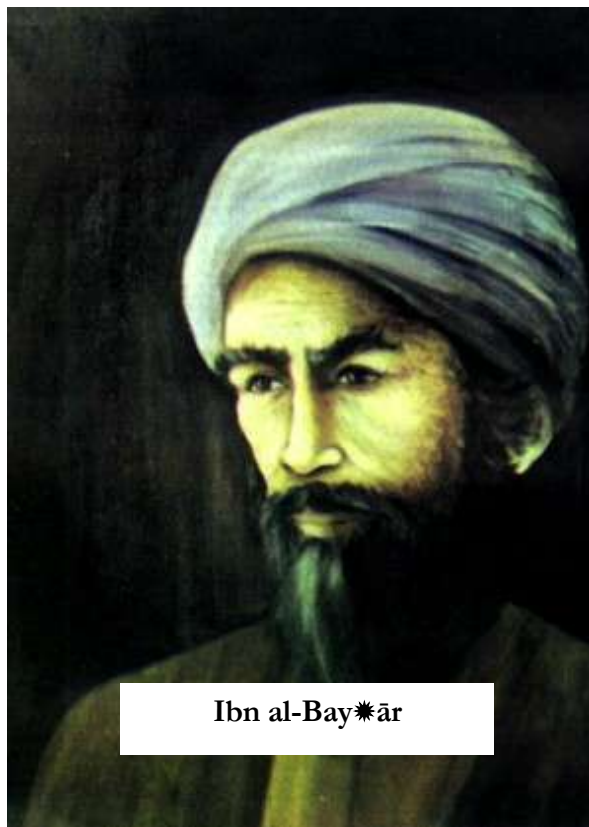
In astronomy he wrote a treatise on the motion of the sphere, *Kitāb fī-Harakat al-Falak*. He summarized *Almagest* and divided it into two parts: description of the spheres, and movement of the spheres. He also wrote commentaries on Plato's *Republic*.¹⁰³

3.24 Ibn al-Bayṣār (d. 1248 C.E.)

¹⁰²*www.ummah.net, op. cit.*, s.v. "Ibn Rushd"

¹⁰³*Idem*

Abū Muhammad Abdullah Ibn Ahmad Ibn al-Bay*ār Diya al-Din al-Malaqi was one of the greatest scientists of Muslim Spain with specialization in Botany and Pharmacy. He was born in the Spanish city of Malaqa (Malaga) towards the end of the 12th century¹⁰⁴ and he died in Damascus in 1248 C.E.¹⁰⁵



Ibn Bay*ār's major contribution, *Kitāb al-Jāmi' fī al-Adwiya al-Mufrada*, is one of the

greatest botanical compilation dealing with medicinal plants in Arabic. It enjoyed a high status among botanists up to the 16th century C.E. and is a systematic work that embodies earlier works, with due criticism, and adds a great part of original contribution. The encyclopaedia comprises some 1,400 different items, largely medicinal plants and vegetables, of which about 200 plants were not known earlier. The book refers to the work of some 150 authors

¹⁰⁴Abdul Ali, *op. cit.*, p.93.

¹⁰⁵George Sarton, *Op. cit.*, s.v. "al-Baitar"

mostly Arabic and it also quotes about 20 early Greek scientists. His second monumental treatise *Kitāb al-Mughni fi al-Adwiya al-Mufrada* is an encyclopaedia of medicine. The drugs are listed in accordance with their therapeutical value. Thus, its 20 different chapters deal with the plants bearing significance to diseases of head, ear, eye, etc. On surgical issues he has frequently quoted the famous Muslim surgeon, Abūl Qasim Zahrawi. Besides Arabic, Bay*ār gives Greek and Latin names of the plants, thus facilitating transfer of knowledge.¹⁰⁶

3.25 Nasir al-Din al-Ṭusi (1201-1274 C.E.)

¹⁰⁶*www.ummah.net, op. cit.*, s.v. “al-Baitar”

Abū Jafar Muhammad Ibn Muhammad Ibn al-Hasan Nasir al-Din al-Ṭusi was born in Ṭus (Khurasan). In his last year of life he went to Baghdad and died there in 1274 C.E.¹⁰⁷

Nasir al-Din was one of the greatest Scientists, Philosopher, Mathematician, Astronomer, Theologian and Physician of the time and was a



prolific writer. In Mathematics, he made substantial progress in trigonometry, which was compiled by him as a new subject in its own right for the first time. Also he developed the subject of spherical trigonometry, including six fundamental formulae for the solution of spherical right-angled triangles. His most original book on this subject is titled as *Kitāb al Shakl al- Qatta'*.¹⁰⁸ As the chief scientist at the observatory established under his supervision at Maragha, he made significant contribution to Astronomy. The

¹⁰⁷George Sarton, *op. cit.*, s.v. "al-Tusi"

¹⁰⁸Abdul Ali, *op. cit.*, p.8.

observatory was equipped with the best possible instruments, including those collected by the Mongol armies from Baghdad and other Islamic centres. The instruments included astrolabes, representations of constellations, epicycles, shapes of spheres, etc. He himself invented an instrument 'turquet' that contained two planes. He produced new astronomical tables called *Al-Zij-Ilkhani*.¹⁰⁹ Another important work of Tusi is *Tadhkiratun fi 'ilm al-Hayat*. It contains a survey of the whole field of Astronomy. In this work he criticized Ptolemy for his views expressed in *Almagest*.¹¹⁰

¹⁰⁹*www.ummah.net, op. cit.*, s.v. "al-Tusi"

¹¹⁰Abdul Alī, *loc.cit.*

3.26 Ibn al-Nafis (1213-1288 C.E.)

Ibn al-Nafis Damishqi al-Misri was born in Damascus. He died in 1288 C.E.¹¹¹ He donated his house, library and clinic to the Mansuriya Hospital at Cairo.¹¹²



Ibn al-Nafis

His major, crowning and original contribution of great significance was his discovery of the blood circulatory system, which was re-discovered by William Harvey after a lapse of three centuries.¹¹³ He was the first to correctly describe the constitution of the lungs and gave a description of the bronchi and the interaction between the human body's vessels for air and blood. Also, he

¹¹¹*The New Encyclopaedia Britannica, op. cit.*, Vol. 6, p. 217.

¹¹²*www.ummah.net, op. cit.*, s.v. "Ibn al-Nafis"

¹¹³Abdul Alī, *op. cit.*, p.38.

elaborated the function of the coronary arteries as feeding the cardiac muscle.¹¹⁴

The most voluminous of his books is *Al-Shamil fi al-Tibb*, which was designed to be an encyclopaedia comprising 300 volumes, but it could not be completed due to his death. The manuscript is available at Damascus. His book that became most famous was *Mujaz al-Qānūn* and a number of commentaries were written on this. Another famous book embodying his original contribution was on the effects of diet on health entitled *Kitāb al-Mukhtar fi al-Aghdhiya*.¹¹⁵

From what has been discussed above, it is quite obvious that the spirit of enquiry created in the Muslim and the scientific method, i.e., the method of scientific investigation to which they were led due to Islamic teaching resulted in the evolution of modern science. H. G. Wells¹¹⁶ says in his immensely popular historical work, *The Outline of History*:

The thought of the Greeks was hampered by want of knowledge that is almost inconceivable to us today. They had no knowledge of the past of mankind at all ... they had no knowledge of geography beyond the range of the Mediterranean basin and the frontiers of Persia.... Their astronomical ideas were still in the state

¹¹⁴*The New Encyclopaedia Britannica, loc. cit.*

¹¹⁵*www.ummah.net, op. cit., s.v. "Ibn Rushd"*

¹¹⁶Wells Herbert George (1866-1946), English author and political philosopher, most famous for his science-fantasy novels with their prophetic depictions of technology as well as the horrors of 20-century warfare.

of rudimentary speculation. ...One has to remember their extraordinary poverty in the matter of experimental apparatus. They had no accurate means of measuring the minor intervals of time, no really efficient numerical notation, no very accurate scale, no rudiments of telescope or microscope.¹¹⁷

Dr. Robert Briffault states that science flourished in Europe as a result of new spirit of enquiry, a new method of investigation, method of experiment, observation, measurement, development of Mathematics in a form unknown to the Greeks and that spirit and those methods were introduced into the European world by the Arabs.¹¹⁸

¹¹⁷H.G.Wells, *The Outline of History*, New York, Garden City, 1920, p. 308-309.

¹¹⁸ Robert Briffault, *The Making of Humanity*, Lahore, Islamic Book Foundation, 1980, p.191.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, the Compassionate, the Merciful

CHAPTER 3

PROMINENT CONTEMPORARY MUSLIM SCIENTISTS

The Prophet Muhammad (S.A.W.S) is reported to have said that, “Every child is born with Islamic disposition. Then his parents make him a Jew, a Christian or a Magian”¹. It can be inferred from this Hadith that Prophet Muhammad (S.A.W.S) opines that man is influenced by his environment which may lead his deviation from the tendencies of his nature and the Right path of Islam. Similarly, man by nature loves virtue like truth and mercy and hates vices such as falsehood and cruelty.

The man’s status as the vicegerent of Allah makes him accountable for the implementation of commandments revealed by Allah.² Allah created resources for him and bestowed him with intellect, discernment and sagacity so as to enable him to make the best use of all the provisions within the framework of the *shari‘ah*³ and elevated him to the status of *ashraf al-Makbluqāt* (the best creation).⁴

The declaration of the Creator of the universe that everything has been made subservient to man⁵ provides a great incentive for the exploitation of all the resources for the welfare of mankind. The Prophet Muhammad (S.A.W.S) has declared that the search for

¹Isma‘il Al-Bukhāri, *Sahih Al-Bukhari*. Riyadh, Saudi Arabia, Maktab Dar-us-Salam, 1994, vol.6, Hadith no.298.

² *Al-Qur’an*, 2:30.

³ The collective name for all the laws of Islam.

⁴ *Al-Qur’an*, 31:20. “Do you not see that Allah has made subservient to you whatever is in the heavens and whatever is in the earth and lavished on you His visible and unseen favours?”

⁵ *Ibid.*, 31:20.

‘ilm (knowledge) is a duty laid on every Muslim⁶. The *Qur’ān* provides some clear instructions to believers which from the starting point of serious activities in the field of scientific studies and research. Allah (S.W.T.) commands the Muslims to travel throughout the world in order to see the fate of those who rejected the truth.⁷ Another divine command imposes a permanent obligation upon Muslims to prepare the maximum possible force and war material so that they could be able to frighten their enemies as well as the enemies of Allah and others beside them whom they know not and Allah knows them⁸. This is one of the important incentives for the accumulation of power, the organization and development of war industries and the invention of new weapons and equipment.⁹

Thus a great deal of emphasis has been laid in the *Qur’ān* on the importance for different scientific methods such as observation, reflection, reasoning, analogical reasoning, deductive and inductive reasoning.

The Allah (S.W.T.) commands the man to observe and reflect upon the works of Allah in the heavens and the earth. The physical

⁶Sulaman bin Ahmad Al-Tabrāni, *Al-Mu‘ajim Al-Kabir*, Bīrut, Daru Al-Ahya’ wa Al-Turath, 1986, vol. 10, Hadith No. 10439. See also the 'introduction' to Ibn Majah's Sunan; *Bihar al-anwar*, vol. I, p. 177.

⁷*Al-Qur’an*, 6:11.

⁸*Ibid.*, 8:60.

⁹M.Saud, *Islam and Evolution of Science*, New Delhi, Adam Publishers, 2003, p.3.

processes are treated as signs of Allah for those who reflect on them.¹⁰

The *Qur'an* invites people towards reality via reason at different places. It mentions: “Assuredly in the creation of the heavens and the earth; in the alternation of the night and the day; in the sailing of the ships through the ocean for the profit of mankind; in the rain which Allah sends down from the skies and the life which He gives therewith to an earth that is dead; in the beasts of all kinds that He scatters through the earth; in the change of the winds and the clouds which they trail like their slaves between the sky and the earth; (here)indeed are signs for people who use their ‘*aqal* (reason)”¹¹, “Have they not traveled through the land that they would have hearts to ‘*uql* (understand) with and ears to hear with? For indeed it is not the eyes that grow blind, but it is the hearts with in the

¹⁰ Man has been commanded to observe whatever is (visible) in the heavens and the earth (*Al-Qur'an*, 10:101). He has been persuaded to look into the processes of the growth of food grains (*Al-Qur'an*, 81:24-32) and the flight of birds during which they expand and contract their wings (*Al-Qur'an*, 67:19). In order to discover a fact reflecting over whatever has been observed is essential. The significance of reflection has been stressed in the *Qur'an*. A number of physical processes mentioned frequently in the *Qur'an* have been characterized as signs of Allah (S.W.T.) for those who reflect. For instance the glorious *Qur'an* mentions: “Can the blind and the seeing be alike? Will you not ponder?” (*Al-Qur'an*, 6:50), “And in the earth are tracts (diverse though) neighbouring, and gardens of vines and fields sown with corn, and palm trees - growing out of single roots or otherwise: watered with the same water, yet some of them We make more excellent than others to eat. Behold, verily in these things there are signs for those who understand!” (*Al-Qur'an*, 13:4), “They have hearts wherewith they understand not, eyes wherewith they see not, and ears wherewith they hear not. They are like cattle, - nay more misguided: for they are heedless (of warning)” (*Al-Qur'an*, 6:179) and “Have they not done *tajakkur* (pondered) upon themselves? Allah did not create the heavens and the earth, and that which is between them, except with (the purpose of) truth and for an appointed term (*Al-Qur'an*, 30:9).

¹¹ *Al-Qur'an*, 2:164.

bossoms, that grow blind”¹², “And for you He has subjected the night and the day, and the sun and the moon to be of service, and the stars are also subjected in service by His command. Verily, herein are signs for the people who have ‘*aql* (reason)’”¹³, “If there were, in the heavens and the earth, other gods besides Allah, there would have been confusion in both!”¹⁴.The reasoning employed in the above mentioned last verse is designed to focus attention on the Oneness of Allah by arguing that in case there had been many gods, the universe would have plunged into chaos and disorder. But since it is safe and operating with an extraordinary precision, it means that there is only one Creator and Administrator known as Allah (S.W.T.).

The following Qur’anic verse provide an example of the analogical reasoning: “It is Allah Who sends forth the Winds, so that they raise up the Clouds, and We drive them to a land that is dead, and revive the earth therewith after its death such is the Resurrection”¹⁵. In this verse an inference has been drawn from the revival of dead land that Allah will resurrect the dead human beings on the Day of Judgment.

¹² *Ibid.*, 22:46.

¹³ *Ibid.*, 16:12.

¹⁴ *Ibid.*, 21:22.

¹⁵ *Ibid.*, 35:9.

The deductive method of reasoning can be seen in the verse that: “Allah is the Creator of all things, and He is the Guardian and Disposer of all affairs”¹⁶. It can be deduced from this verse that human beings, animals and plants are creatures of Allah because all of them are things. ¹⁷

The inductive method used in the *Qur'an* is equally lucid and forceful as shown in the verse that: “Say (O Muhammad S.A.W.S): "O Allah! Possessor of the kingdom, You give the kingdom to whom You will, and You take the kingdom from whom You will, and You endue with honour whom You will, and You humiliate whom You will. In Your Hand is the good. Verily, You are Able to do all things. You make the night to enter into the day, and You make the day to enter into the night (i.e. increase and decrease in the hours of the night and the day during winter and summer), You bring the living out of the dead, and You bring the dead out of the living. And You give wealth and sustenance to whom You will, without limit (measure or account)”¹⁸. This verse leads to the conclusion that Allah is Omnipotent by virtue of His command over kingdom which He may confer on anyone and may seize it from anyone and His ability to honour or disgrace anyone.¹⁹

¹⁶ *Ibid.*, 39:62.

¹⁷ M. Saud, *op.cit.*, p.4.

¹⁸ *Al-Qur'an*, 3:2526.

¹⁹ M. Saud, *op.cit.*, p.5.

The above Qur'anic scientific approaches paved the way to the true understanding of nature and natural phenomena. They also encourage a first hand study of nature by observation and experimentation and produce a universal longing for scientific inquiry.²⁰ It is this habit of observation, reflection and reasoning which the *Qur'ān* seeks to cultivate among Muslims. In the backdrop of these guidelines, the contribution of some prominent Muslim scientists can be appreciated in an objective manner.

4.1 Mian Muhammad Afzal Husain (1889-1970 C.E.)

Professor Main Muhammad Afzal Husain, the pioneer Zoologist among the Muslim of the south Asia Subcontinent,²¹ made a comparative study of the mandibles of crustacean (1918) and won the Charles Darwin Prize of the Christ's college. On his return, he was entrusted various responsibilities-educational, administrative, advisory and others. He introduces the bee-keeping in the Agricultural Colleges, Lyallpur. He also published notes on the porcupine and the fruit-eating bats or the flying foxes (1928-29). He initiated his research work on various aspects of Agriculture Entomology at the Punjab Agriculture College, Lyallpur (now

²⁰Khwaja Abdul Waheed, *Islam and the Origins of Modern Science*, Lahore, Islamic publications ltd, 1978, p. 8.

²¹Dr. Mohammad R. Mirza Muhammad Iqbal Siddiqi (ed.), *Muslim Contribution to Science*, Delhi, New Era Publishers, 1997, p.36.

University of Agriculture, Faisalabad) and studied the different aspects of the biology of the desert locust on the scientific lines. He experimented with the silk-worm breeding and studied the pests of the cotton and fruits. He also studied the habits of some birds in relation to the agriculture. He concluded that the starling was a very useful bird for the farmer as it is insectivorous and helps to destroy the locusts. He pointed out that the parrot is a very harmful bird for the fruits. Because, besides eating away fruits from gardens, it destroys a good deal of the fruits aimlessly. He contributed as the vice-chancellor of the Punjab University for several terms since 1938.

The learned professor was a Fellow of various educational and scientific organizations. He was a Foundation Fellow of the National Institute of India, and an elected Fellow of the National Academy of Science, India. He was the President of the Agricultural Section of the Indian Science Congress in 1933, President of its Entomological section in 1938, and was elected as its General President in 1946. He is regarded as the *Father of Entomology* in the Subcontinent. In Pakistan, he was elected as the First General President of the Pakistan Association for the Advancement of Science in 1948. He was a Foundation Fellow of the Pakistan Academy of Sciences and its first President for two successive years. He also contributed in the capacity of foundation fellow and the first President of the Zoological Society of Pakistan.²²

²² *Ibid.*, p.36-37.

4.2 Dr. Hamid Khan Bhatti (1895-1980 C.E.)

Dr. initiated research at the Department of Zoology, Government College, Lahore as an M.Sc. student. He worked on the “*Skeleton of Rita Rita* (Hamilton)” and submitted his thesis to the University of the Punjab in partial fulfillment for the degree of M.Sc. (Zoology) in 1916. He worked on *The Integument and dermal skeleton of Siluroides* at the University of Cambridge and received his Ph.D. in 1936. This work published in 1938 and is the most comprehensive, valuable and outstanding.²³

Dr. worked on various problems resulting in the publications of several papers on fish and fisheries of the Punjab. His paper entitled *Habits and habitats of food fishes of the Punjab* (1934) is one of the most valuable contributions of its kind and is now a classic. After his Ph.D from the University of Cambridge he again engaged himself in research on the fish and fisheries of the Punjab in various capacities as Fisheries research Officer, Punjab, upto 1939. He presented many papers at different sessions of the Indian Science congress, Pakistan Science Conferences and others. His research publications deal with the habits; ovulation; parental care; methods of fishing; fish diseases; weight-length relationships; fish culture; fisheries legislation; conservation and development; stream pollution; exotic fishes; and catching and marketing of fish in the Punjab. He was the first to

²³ *Ibid.*, p.37.

induce fishes to spawn by the use of mammalian pituitary in south Asia. He succeeded in inducing ovulation of *cirrhinus mrigala* (Hamilton) in 1938.

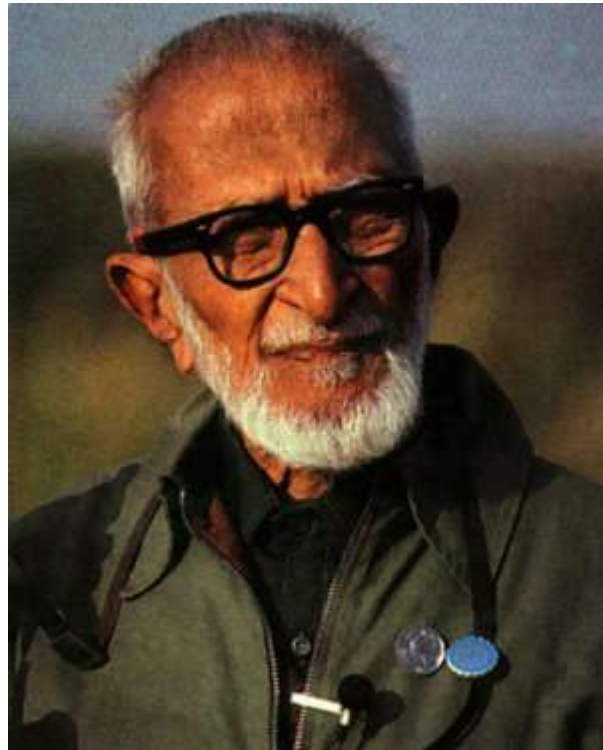
After retirement from the fisheries service, he joined the University of the Punjab as the Head of the Department of Zoology in 1948 and guided research on fish till his retirement in 1953. He joined the F.C. college, Lahore as Professor of Zoology in 1953 and retired in 1971. He visited the United States as a visiting professor of biology at Swarthmore College, Swarthmore, Pennsylvania (1962-63). Professor Bhatti also worked as the officer incharge of the “Soil Zoology Scheme” of the Pakistan Agricultural Research council from 1959 to 1962 and attended the colloquium on “Dynamics of soil communities” held at Braunschweig-Volkenrode, West Germany in 1966. He published several papers on the systematic and biology of the earth worms of Lahore as well (1960-62).

Professor Bhatti was a Fellow/Member of a large number of Academic and Scientific bodies in Pakistan and abroad. He was elected as the president of the biology section of the 3rd. All Pakistan Science conference in 1951 and delivered his presidential Address entitled, *planning of biological research in freshwater fisheries*. In 1962, he was again elected as the president of the Biology section for the second time of the 14th. All the Pakistan science conference and delivered his president Address on *soil fauna and Soil Health*. He was a Foundation Fellow of the Pakistan Academy of Sciences, and its president for the years 1972-73. He was also the Foundation Fellow

of the Zoological Society of Pakistan, and its president for the years 1973-75.²⁴

4.3 Salim 'Ali (b.1896 C.E.)

The well known Ornithologist, Salim Moizuddin Abdul 'Ali was born on November 12, 1896. He was the president of the Bombay Natural History Society and past editor of its journal. He was also the head of the University Department of Field Ornithology, Bombay Natural History Society,



Salim 'Ali

affiliated to the University of Bombay for research leading to the degree of M.Sc. and Ph.D. He was a fellow of the Indian National Science Academy and member of several other Scientific Organizations in India. He was an Honorary Member of the Ornithological Organization of Germany, France, United Kingdom

²⁴ *Ibid.*, p.37-38.

and U.S.A. He had been awarded medals and prizes by many Indian and other organizations. He was a Member of Honour of the World Wildlife Fund.²⁵ Salim Ali has travelled all over India on his bird-watching surveys. It is claimed that there is hardly a place in the country where his heavy rubber shoes have not left their mark.

Salim is a world renowned expert on weaver birds. He discovered Finn's Baya which was believed to have been extinct for 100 years until he discovered it in the Kumaon hills. He is a recipient of the J. Paul Getty Wild Life Conservation Prize for his contributions to ornithology²⁶. For the first time in the history of ornithology, he noted how Sarus cranes mate, brood over their eggs, in turn, and how chicks are hatched and taken care of. He also observed one human quality in this bird: the parents love not only their eggs and chicks but also each other. He once said, "His memoirs are a veritable gazetteer of natural history of the India of his day."²⁷

In 1941 he published *The Book of Indian Birds* that contained lively descriptions and coloured pictures of every species. It made spotting

²⁵*Ibid.*, p.39.

²⁶ Ornithology is the study of birds. India has the credit of having eminent ornithologists who are Muslims. Mughal Emperor Jahangir was an expert ornithologist. Jahangir described with care and accuracy various characteristics of animals and birds, their geographical distribution and behavior. In 1958 there was sensation in the world of ornithology when a Russian researcher, A. Ivanov, discovered a portrait of the dodo, a large, non-flying pigeon-like bird which had become extinct about three centuries ago, in a collection of paintings at the Institute of Orientalists of the Soviet Academy of Sciences. There was nothing to identify the painter, but the style was without doubt of Ustad Mansur, the court painter of Jahangir. Now there is other evidence to show that it was the portrait of a Mauritius dodo which a merchant had presented to the Emperor around 1624. So, in the world of ornithology, Jahangir and the dodo made a dramatic reappearance nearly three centuries after they had died.

²⁷ *www.irfi.org*, s.v. "Contribution of Muslim Scientists to India"

a bird easy for the layman.²⁸ He also published *Birds of Kutch* in 1945, *Birds of Sikkim* in 1962 and *Field Guide to the Birds of the Eastern Himalayas* in 1977²⁹. His excellent contribution entitled *Handbook of the Birds of India and Pakistan* in 10 volumes published in collaboration with S. Dillon Ripley (1968 – 1974), an ornithologist of international repute. This work contains all that is known of birds of the subcontinent, their appearance, where they are generally found, their breeding habits, migration and what remains to be studied about them³⁰.

4.4 Dr. Muhammad Babar Mirza (1898-1975 C.E.)

Dr. Mirza joined the Osmania University, Hyderabad, Deccan as the Head of the Biology department. In 1926, The Nizam's Government sanctioned him an educational loan for the higher studies in Germany. In 1929, he received the degree of Doctor of Natural Philosophy (Dr. Phil. Nat.) from the University of Frankfurt am Main and resumed his duties at the Osmania University. At the initiative of Sir Ross Masood – the then Vice-Chancellor of the Muslim University – he joined the Department of Zoology, Aligarh Muslim University in January, 1930 as its chairman. He started the M.

²⁸ *Idem*

²⁹ Dr. Mohammad R. Mirza Muhammad Iqbal Siddiqi (ed.), *op.cit.*, p.39.

³⁰ *www.irfi.org, loc.cit.*

Sc. Classes in Zoology and the first batch passed out in 1932. He introduced the Postgraduates specialization in two important branches of Zoology – Helminthology³¹ and Entomology.³²

Dr. Mirza was an outstanding helminthologist and made valuable contribution on the morphology, bionomics and epidomology of the guinea-worm (*Dracunculus medinensis Velch*). He also worked on the systematics of the nematodes and described many new species in collaboration with his associates. In 1956, Professor Mirza went to U.S.A. as a visiting professor and worked at the University of Southern California at Los Angles and Illinois University. There, in collaboration with Lary Roberts (1957), he propounded his famous theory of guinea worm zoonosis in United States. In 1961, after retirement from the Muslim University, Aligarh, he migrated to West Germany but there too he did not give up his love for research in Parasitology and continued to work on the systematics of Acanthocephala till his death in 1975.

He was a Fellow/Member of a number of Scientific Organizations: Royal Microscopical Society, London; Zoological Society, London; Zoological Society of India; Indian Academy of Sciences; Institute of Sciences (India) and others.³³

³¹ The scientific study of parasitic worms.

³² Dr. Mohammad R. Mirza Muhammad Iqbal Siddiqi (ed.), *op.cit.*, p.40.

³³ *Ibid.*, p.40-41.

4.5 Dr. Muhammad Rahimullah Quershi (1907-1977 C.E.)

Dr. Quershi received the B.Sc. Degree from the Aligarh Muslim University. He initiated the career as a Lecturer in Zoology at the Osmania University, Hyderabad (Deccan) in 1927 and continued up to 1940. He received his B.Sc. from the University of Madras on thesis entitled comparative study of the morphology and probable functions of the pyloric caeca in Indian fishes together with a discussion of their homology (1945). He worked as the fishery Officer (incharge) in Hyderabad (Deccan) during 1940-48.³⁴

Dr. Quershi was an enthusiastic researcher and a prolific writer. In addition to more than 100 research publications, he was the author of several popular articles and books on Fish and Fisheries in Pakistan in urdu as well as in English. His publication entitled *Marine fishes of Karachi and coasts of Sind and Makran (1955)*; *Pakistan's fisheries (1961)*; *Common fresh water fishes of Pakistan (1965)* and his presidential address on *Marine Fisheries of Pakistan-development and Research* in the 17th Pakistan science conference (1965) are basic sources of information on fish and fisheries in Pakistan. His last publication entitled *Annotated Bibliography of Marine Fish and Fisheries* was published in 1980 posthumously.

³⁴ *Ibid.*, p.43.

He was a Fellow/member of various scientific organizations and was elected as president of the Zoological Society of Pakistan (1975-77).³⁵

4.6 Dr. Sayyid Zahoor Qasim

Dr. Qasim has got early education in Allahabad and then at the Aligarh Muslim University, Aligarh from where he took his M.Sc. degree in Zoology. He stood first in the order of Merit for which he was awarded University Gold Medal. For a few years, he was a lecturer in the Department of Zoology at Aligarh before proceeding to the United Kingdom for higher studies in 1953. He returned to India in December of 1956 and joined the Department of Zoology of AMU as a Lecturer. He became Reader in 1957 and started a new laboratory of Fish and Fisheries in the Department. In 1962, he joined the Central Institute of Fisheries Education, Bombay (Mumbai) as a Professor of Fisheries Biology and in 1964, moved to Cochin as Assistant Director in the Directorate of International Indian Ocean Expedition (IIOE) under the Council of Scientific and Industrial Research (CSIR). Here he extensively worked on biological oceanography especially on the primary productivity of Kerala Backwaters and on the atolls of Lakshwadeep. From 1970 to 1973, Dr. Qasim was the Director of the Central Marine Fisheries Research Institute at Cochin. He also held the additional charge of the Central

³⁵ *Ibid.*, p.43-44.

Institute of Fisheries Technology, Cochin for about one year. In January 1974, he took over as the Director of the National Institute of Oceanography (NIO), Goa. In February 1976 he was responsible for the commissioning of the first Oceanographic Research Vessel Ganeshani for NIO. He initiated many new programs on the productivity of the Arabian Sea and Bay of Bengal. In May 1981, Dr. Qasim was appointed Secretary to the Government of India in the Department of Environment (DOE) and within a year (April 1982) he took over as Secretary of the newly established Department of Ocean Development.³⁶

Dr. Qasim is a Fellow of the Indian National Science Academy, New Delhi, Indian academy of Sciences, Bangalore, National Academy of Sciences, Allahabad, among many others. Under his guidance nearly 40 students obtained their Ph.D. degrees from various universities in India.

Dr. Syyid Zahoor Qasim promoted new lines of work in Fisheries Biology and initiated the development of mussel culture and pearl culture techniques for the first time in India. This work earned him the prestigious award of “Padma Shri.” He has been responsible for the acquisition of a second Oceanographic Research Vessel "Sagar Sampada" for the Indian Oceanographic research. Dr. Qasim led India's First Expedition to the Antarctica and successfully

³⁶*www.infi.org, loc.cit.*

organized and guided the other seven expeditions to the frozen continent from 1981 to 1988.

His work on Fisheries Biology, primary productivity, mariculture particularly mussel and pearl culture, estuarine ecology, environmental pollution and Antarctic research will always be quoted profusely. He has published more than 200 original research papers in national and international journals. For his original work and distinguished services, he won many honors and awards.³⁷

4.7 Sayyid Muhammad Naquib al-Attas (b.1931 C.E.)

Sayyid Muhammad Naquib al-Attas was born in September 5, 1931 in Bogor, Java. He is a prominent contemporary Muslim thinker. He is one of the few contemporary scholars who is thoroughly rooted in the traditional Islamic sciences and who is equally competent in



Naquib al-Attas

³⁷*Idem*

theology, philosophy, metaphysics, history, and literature. He traveled widely, drawn especially to Spain and North Africa where Islamic heritage had a profound influence on him. His formal primary education began at age of 5 in Johor, Malaysia, but during the Japanese occupation of Malaysia, he went to school in Java, in Madrasah *Al-'Urwatu'l-wuthqa*. After World War II in 1946 he returned to Johor to complete his secondary education. He received the M.A. degree with distinction in Islamic philosophy in 1962. Al-Attas went on to the School of Oriental and African Studies, University of London where he worked with Professor A. J. Arberry of Cambridge and Dr. Martin Lings. His doctoral thesis (1962) was a two-volume work on the mysticism of Hamzah Fansuri.

His vision is integrated, multifaceted and creative. Al-Attas' philosophy and methodology of education have one goal: Islamization of the mind, body and soul and its effects on the personal and collective life on Muslims as well as others, including the spiritual and physical non-human environment. He is the author of twenty-seven authoritative works on various aspects of Islamic thought and civilization, particularly on Sufism, cosmology, metaphysics, philosophy and Malay language and literature.

In 1987, with al-Attas as founder and director, the International Institute of Islamic Thought and Civilization (ISTAC) was established in Kuala-Lumpur. This institution strives to bring an integrated Islamization into the consciousness of its students and faculty. Al-Attas envisioned the plan and design of every aspect of ISTAC, and

has incorporated Islamic artistic and architectural principles throughout the campus and grounds. Al-Attas maintains that modern science sees things as mere things, and that it has reduced the study of the phenomenal world to an end in itself. Certainly this has brought material benefits, however it is accompanied by an uncontrollable and insatiable propensity to destroy nature itself. Al-Attas maintains a firm critique that to study and use nature without a higher spiritual end has brought mankind to the state of thinking that men are gods or His co-partners. “Devoid of real purpose, the pursuit of knowledge becomes a deviation from the truth, which necessarily puts into question the validity of such knowledge.”³⁸

Al-Attas views Western civilization as constantly changing and ‘becoming’ without ever achieving ‘being’. He analyzes that many institutions and nations are influenced by this spirit of the West and they continually revise and change their basic developmental goals and educational objectives to follow the trends from the West. He points to Islamic metaphysics which shows that reality is composed of both permanence and change; the underlying permanent aspects of the external world are perpetually undergoing change.³⁹

Al-Attas makes no attempts to accommodate modern Western scientific spirit through a reinterpretation of Islam, or to naively import Western technological skills and products while

³⁸Syed Muhammad Naquib Al-Attas, *Islam and Secularism*, Kuala Lumpur, International Institute of Islamic Thought and Civilization (ISTAC),1993, p.36.

³⁹*Ibid.*, p.82.

simultaneously keeping intact the traditional understanding of religion. Problems in the world, he says, are not because of illiteracy or ignorance of modern knowledge; the reasons are epistemological and metaphysical. Modern sciences must be acquired, but their philosophical foundations must be recast into the Islamic metaphysical framework. “We do affirm that religion is in harmony with science. But this does not mean that religion is in harmony with modern scientific methodology and philosophy of science. Since there is no science that is free of value, we must intelligently investigate and study the values and judgments that are inherent in, or aligned to, the presuppositions and interpretations of modern science. We must not indifferently and uncritically accept each new scientific or philosophical theory without first understanding its implication and testing the validity of values that go along with the theory. Islam possesses within itself the source of its claim to truth, and does not need scientific or philosophical theories to justify such a claim. Moreover, it is not the concern of Islam to fear scientific discoveries that could contradict the validity of its truth.”⁴⁰ Islamic science must interpret the facts of existence in correspondence with the Qur’anic system of conceptual interrelations and its methods of interpretation, not the other way around, by interpreting the system in correspondence with the facts.

⁴⁰Syed Muhammad Naquib Al-Attas, *Prolegomena to the Metaphysics of Islam: An Exposition of the Fundamental Elements of the Worldview of Islam*, Kuala Lumpur, International Institute of Islamic Thought and Civilization (ISTAC), 1995, p.38.

Since the role of science is to be descriptive of facts, and facts undergo continual change by virtue of their underlying reality which is process, modern philosophy and science, in a secular way, consider change to be the ultimate nature of reality. Al-Attas maintains that reality is at once both permanence *and* change, not in the sense that change is permanent, but in the sense that there is something permanent whereby change occurs. Change does not occur at the level of phenomenal things, for they are ever-perishing, but at the level of their realities which contain within themselves all their future states.

Al-Attas advocates that the categories of knowledge which were fundamental to the Islamic tradition are fundamental to any real modern education. In the traditional Islamic worldview, knowledge was of two kinds, the open-ended *fard kifayah* knowledge, which includes the natural, physical and applied sciences, and the *fard`ayn*, the absolute nature of the knowledge pertaining to God and the spiritual realities and moral truths. *Fard`ayn* knowledge is not static, but dynamic, and it increases according to the spiritual and intellectual abilities as well as social and professional responsibilities of a person. Contemporary modern knowledge needs to be delivered from its interpretations based on secular ideology. This requires a critical examination of the methods of modern science; its concepts, presuppositions, and symbols; its empirical and rational aspects, and those impinging upon values and ethics; its interpretations of origins; its theory of knowledge; its presuppositions on the existence of an

external world, of the uniformity of nature and of the rationality of natural processes; its theory of the universe; its classification of the sciences; its limitations and inter-relations with one another of the sciences, and its social relations.⁴¹ Science, according to Al-Attas, is a kind of *ta'wil* or allegorical interpretation of the empirical things that constitute the world of nature⁴². The natural world is a book with knowledge; but that knowledge is not evident merely from the physical phenomena; they are nothing but signs, the meaning of which can be understood by those who are equipped with proper knowledge, wisdom and spiritual discernment. Some natural phenomena are obvious as to their meaning, while other natural things are ambiguous; similarly there are clear verses (*muhkamat*) of the Qur'an, while other verses are ambiguous (*mutashabihat*). The scientifically relevant verses in the Qur'an necessarily open themselves for further interpretation, based on the cumulative knowledge of future generations. He says that the fact that the early Muslims were not cognizant of the many scientific truths embedded in the Qur'an proves that the discoveries of these truths will not contradict its universal spiritual and religious-moral teachings.

⁴¹Syed Muhammad Naquib Al-Attas, *op.cit.*, p.114.

⁴²Syed Muhammad Naquib Al-Attas, *Islam and the Philosophy of Science*, Kuala Lumpur, ISTAC, 1989, p. 116.

4.8 A.P.J. Abdul Kalam (b.1931 C.E.)

Avul Pakir Jainulabdeen Abdul Kalam, popularly known as Dr. A.P.J. Abdul Kalam, who received national and international attention as "India's Missile Man"⁴³ was born on October 15th, 1931 in Rameswaram, Tamilnadu, India. His father, a devout Muslim, owned boats



A.P.J. Abdul Kalam

which he rented out to local fishermen and was a good friend of Hindu religious leaders and the school teachers at Rameshwaram. APJ Abdul Kalam mentions in his biography that to support his studies, he started his career as a newspaper vendor. This was also told in the book, *A Boy and His Dream: Three Stories from the Childhood of Abdul Kalam* by Vinita Krishna. He was the eleventh President of India, serving from 2002 to 2007.⁴⁴ He began his schooling at

⁴³*www.irfi.org*, s.v. "A.P.J.Kalam"

⁴⁴ *Encyclopedia Wikipedia*, s.v., "Abdul Kalam"

"Samiyar" school and continued it at Schwartz High School in Rameswaram. Graduating from St. Joseph's College in Tiruchi, he completed a diploma in Aeronautical Engineering from the Madras Institute of Technology. He was awarded a Doctor of Science (D.Sc.) degree (Honoris Causa). He joined the Defense Research Development Organization (DRDO) in 1958. He is considered a progressive mentor, innovator and visionary in India. He is also popularly known as the *People's President*. His term as president ended on July 25, 2007. In October 2007, Kalam received an Honorary Doctorate of Science from the University of Wolverhampton.⁴⁵

The Muslim scientist from the temple town of Rameswaram in south India has indeed come a long way. He's inspiring a nation to believe in itself, motivating scientists to exploit technology for a better quality of life. We are, after all, a nation of one billion people, is his argument. Let's have a national vision and let's convert that vision into a national mission, he insists. Kalam's belief in India and its potential found expression in his book (co-authored with Dr. Y.S. Rajan) *India 2020: A vision for the New Millennium*.⁴⁶ In this book, he outlines his perception of India's strengths and weaknesses and outlines his prescription for a powerful India. He believes that national security and economic strength are the two pillars of a resurgent India. He's helped the country as far as security goes and

⁴⁵ *Idem*

⁴⁶He dedicated this book to a little Hyderabad schoolgirl who once told him, 'Uncle, I want to live in a developed India.'

never loses an opportunity to exhort others to think big and realize the second.

Dr. Abul Kalam succeeded in uniting 12 universities, 30 defence laboratories, the Council of Scientific and Industrial Research (CSIR), the Indian Space Research Organization (ISRO) and dozens of public and private sectors. He is the brain behind “Agni”;⁴⁷ the indigenously developed 17 meter long and 75 ton multiple stage missile with a payload of 1000 kg (kilogram). Its range is anywhere between 1600 km (kilometers) to 2500 km. He was assisted by a 400-strong team of scientists. Dr. APJ Abul Kalam also worked on projects such as “Prithvi”(a surface-to-surface battlefield missile), “Nag” (an anti-tank missile), “Akash”(a swift, medium-range surface-to-air missile), “Trishul” (a quick-reaction surface-to-air missile with a shorter range). All these missiles were launched according to the schedule⁴⁸. For his contributions to India's Missile Program and the successful detonation of Nuclear Weapons in May 1998, he was appointed as Advisor to the Defense Minister and subsequently awarded in 1997 “*Bharat Ratna*” the highest civilian award by the Government of India. The other awards received by Kalam are “*Padma Vibhushan*” in 1990 and “*Padma Bhushan*” in 1981⁴⁹.

⁴⁷An intermediate range ballistic missile.

⁴⁸www.muslimindia.com.

⁴⁹www.muslimindia.com.

APJ Abul Kalam also replaced heavy metallic calipers⁵⁰ weighing over three Kilograms by Carbon braces which weighed just 300 grams for disabled children in three weeks.⁵¹

Kalam continues to take an active interest in other developments in the field of science and technology as well. He has proposed a research programme for developing bio-implants. He is a supporter of Open source software over proprietary solutions and believes that the use of open source software on a large scale will bring more people the benefits of information technology. Kalam's belief in the power of science to resolve society's problems and his views of these problems as a result of inefficient distribution of resources is modernistic. He also sees science and technology as ideology-free areas and emphasizes the cultivation of scientific temper and entrepreneurial drive. In this, he finds a lot of support among India's new business leaders like the founders of Infosys and Wipro,⁵² who began their careers as technology professionals much in the same way Kalam did.

Kalam has written several inspirational books, most notably his autobiography *Wings of Fire*, aimed at motivating Indian youth. Another of his books, *Guiding Souls: Dialogues on the Purpose of Life*

⁵⁰A leg splint consisting of metal rods and straps that enables the hip bone, rather than the foot, to support weight when walking.

⁵¹www.nagpurcity.net

⁵²Leading Indian IT corporations.

reveals his spiritual side. He has written poems in Tamil as well. It has been reported that there is considerable demand in South Korea for translated versions of books authored by him.⁵³

4.9 Sayyid Husain Nasr (b. 1933 C.E.)

Sayyid Husain Nasr was born in Tehran 1933C.E. After receiving his early education in Iran, Nasr studied physics and Mathematics at Massachusetts Institute of Technology (MIT) and received his doctorate from



Sayyid Husain Nasr

Harvard University in 1958 with specialization in Islamic cosmology and science. From 1958 until 1979, he was professor of the history of science and philosophy at Tehran University where he was also the dean of the Faculty of Letters for some years. He also served as

⁵³ *Encyclopedia Wikipedia, loc.cit.*

president of Aryamehr University in Iran. In 1962 and 1965, he was visiting professor at Harvard University and in 1964-65 the first Agha Khan Professor of Islamic studies at the American University of Beirut. He was the founder and first president of the Iranian Academy of Philosophy. In 1979, he migrated to the United States and taught at several American universities before finally joining the George Washington University, Washington DC in 1984. In 1999 he was chosen to be the first Muslim scholar to receive the Templeton Religion and Science Course Award.⁵⁴

Sayyid Nasr has written a number of books and articles on the relation between religion and science in general and Islam and science in particular. He has also been a pioneering figure on the relation between religion, science, and the environmental crisis. His famous works include:

1. *An Introduction to Islamic Cosmological Doctrines*

This is his doctoral dissertation, which appeared first in 1964. It is the first modern book devoted to the study of Islamic cosmology. In its *Introduction*, Nasr discusses three prominent figures of Islamic science and their approach to the study of nature.

2. *Science and Civilization in Islam*

⁵⁴ www.cis-ca.org, s.v. "Sayyid Hussain Nasr"

First published in 1968, this work has brought the concept of 'Islamic science' to the fore with full force.⁵⁵ This work has remained unsurpassed as the authoritative statement on its subject. With his characteristic breadth of learning, clarity of exposition and insight, S. H. Nasr presents here for the first time a full picture of Islamic science, not as a chapter in the history of Western science, but as an integral aspect of Islamic civilization and the Islamic intellectual tradition.

By means of an historical presentation, an analysis of its forms, including the use of passages from the writings of many Muslim scientists and philosophers, the author is able not only to convey a sense of the operative context of Islamic science but demonstrate its interrelatedness with the sapiential wisdom on which it is based. An introductory chapter provides the reader with a necessary orientation to the subject according to the principles of Islam, while subsequent chapters survey the whole spectrum of the individual sciences from cosmology, philosophy, theology to alchemy, physics, mathematics, astronomy and medicine concluding with a chapter on the Gnostic tradition.⁵⁶

Nasr discusses the meaning of science within the context of Islamic religious worldview and analyzes the achievements of Islamic scientific tradition in such fields as medicine, astronomy,

⁵⁵ *Idem*

⁵⁶ *www.kitaabun.co.uk*, s.v. "Sayyid Hussain Nasr"

mathematics, algebra, chemistry, physics, geography, and natural history. The book is based on the original sources and remains one of the best compendia of science in the Islamic civilization.⁵⁷ According to him Islamic Sciences in their essence can be understood only within the principles derived from the source of revelation which is the Qur'ān and any study outside it would remain superficial and incomplete.

3. *An Annotated Bibliography of Islamic Science*

Nasr compiled it in three volumes with William Chittick. It is a dexterous presentation of the available material on the history of Islamic science.

4. *Islamic Science: An Illustrated Study*

It is Nasr's most famous work on Islamic science. It is the first of its kind in presenting Islamic science, its philosophical premises, its history and development with beautiful visual material, pictures, and diagrams. He argues convincingly that Islamic science had a distinct identity and displays its unique Islamic character.

5. *Islamic Life and Thought* (1981)

Here Nasr discusses inner nature of a person. He placed religion above reason. Religion should define goals of a Muslim and all his affairs should then be orientated in accordance with those goals. The modern reformers must reform science, society, state,

⁵⁷ *www.cis-ca.org, loc.cit.*

religion and everything by putting their inner houses in order.⁵⁸
They must have *‘ilm* of Din.

6. *The Young Muslim's Guide to the Modern World* (1993)

Of all the books Sayyid Hussain Nasr has written, this is the most elegant and informative. It was written specifically for Muslims, and in particular young Muslims, urging them to become familiar with their religion and gain an understanding of the modern world from the Islamic point of view in order to respond positively to its challenges. This guide, the first of its kind in any language, presents an exposition of the teachings of Islam as revealed in the Qur'an, explained in the Hadith and Sunnah of the Prophet Muhammad (sallAllahu ‘alaihi wa sallam) and commented upon by Muslim scholars and thinkers, as well as outlining the Western religious and intellectual tradition.

7. *The Islamic Intellectual History in Persia* (1994)

8. *Traditional Islam in the Modern World*

9. *The Encounter of Man and Nature: The Spiritual Crisis of Modern Man*

First appeared in 1968, it is his early work, and was one of the first books to forecast the catastrophic consequences of the environmental crisis. The book is a philosophical critique of the modern conception of nature as inert matter to be conquered and usurped by modern science and technology. This is also the first

⁵⁸ S. H. Nasr, *Islamic life and Thought*, Lahore, Pakistan, Suhail Academy, 1985, p. 153-155.

book in which Nasr takes up the challenge of modern science and its secular outlook.

10. Religion and the Order of Nature

It was published in 1996; here Nasr gives an account of the rise of modern science on the one hand, and the critique of secular and reductionist philosophies concerning nature, on the other. The book also attempts to revive the sacred notion of nature and traditional cosmology with which Nasr has been occupied throughout his intellectual career.

11. Knowledge and the Sacred (1981) and The Need for a Sacred Science (1993)

These are the two most important books in which Nasr has tried to revive sciential⁵⁹ by showing the underlying unity and interrelatedness of the transmitted, intellectual, and physical sciences under the umbrella of metaphysics. Dr. Nasr writes in *Knowledge and the Sacred*:

Most of the major discoveries of physics since Einstein's 1905 theory of special relativity was announced have been the result not of induction or empirical observation but the consideration of aesthetic factors, search for unity, symmetry, and harmony. How often have well-known physicists proposed a theory which they have supported because it was mathematically speaking more "elegant"? Why is there this search for unity in the study of the laws of nature and, in fact, the attainment of ever greater or higher stages of unity? What about the

⁵⁹ Releating to science or knowledge.

appeal of Einstein in 1905 and Dirac in 1929 to symmetry, leading respectively to the special theory of relativity and anti-matter, long before experimental evidence could be provided? Finally, how can one evaluate the so-called Pythagorean period of modern physics covering the era from Bakr to de Broglie, when very important contributions based on Pythagorean harmony and with full knowledge of musical harmony were made to modern physics? ⁶⁰

Dr. Nasr reminds that metaphysical principles can never be proven through physics. The ultimate significance of physics can be grasped only through metaphysics.

Nasr, a celebrated international authority on Islamic Science, defines Islamic Science as the systematic study of natural phenomena within the context of the Islamic worldview, at the heart of which lies the doctrine of *tawhid*, Divine Unity.

Western Science and its concomitant, associated and affiliated technology have affected the various facets of life and thought of Muslims since its introduction in to Islamic world. Muslim thinkers in this period took modern science as the further expansion and growth of the science developed by Muslims during 8th to 14th centuries. Hence they considered that it can be taken back without bothering about its philosophy, methodology and its historical, social and intellectual roots whereas traditional Muslim scholars remained by and large aloof and distant from this science. They

⁶⁰ S. H. Nasr, *Knowledge and the Sacred*, Edin Burgh University, 1983, p.155.

however, tried to protect faith from the onslaught of Western thought but failed to provide a critical examination of modern science on the basis of Islamic criteria. But with the awareness of the negative influence of modern science and its quantitative, unspiritual and secularizing nature in recent times, Muslims have begun to find alternatives.⁶¹ Nasr convincingly demonstrates that the traditional Islamic sciences like mathematics, astronomy, cosmology, natural science and alchemy were based on metaphysics whose primary object was "to read upon the pages of Allah's creation, this primordial message which virgin nature still carries upon the face of her manifold manifestation."⁶² The highest function of the traditional sciences has always been to aid the intellect and the instrument of perception to see the world and in fact all levels of existence not as fact or objects but as symbols, as mirrors in which is reflected the face of the Beloved, from whom all originate and to whom every thing returns.⁶³

This brings us to what is a basic difference between modern science and traditional Islamic sciences, namely the notion of intelligence or intellect. Nasr writes that the traditional sciences are based on hierarchic vision of the universe, one which sees the

⁶¹ S.H. Nasr, "Islam and the problem of modern science", *MAAS Journal of Islamic Science*, Aligarh, Muslim Association for the Advancement of Science (MAAS), 1988, vol.4, p.45.

⁶²S.H. Nasr, "The Role of Traditional Sciences in the Encounter of Religion and Science: An oriental Perspective", *MAAS J. Islamic Science*, Aligarh, Muslim Association for the Advancement of Science (MAAS), 1985, vol.1, No.1,p.10.

⁶³*Ibid.*, p.25.

physical world as the lowest domain of reality, yet one which reflects the higher states by means of symbols which have remained an ever-transparent gate towards invisible for that traditional humanity which have not as yet lost the symbolist spirit.⁶⁴ In Arabic and other Islamic languages a single term, *al 'aql*, is used to signify both reason and intellect, but the distinction between the two as well as their interrelation and the dependence of reason upon intellect is always kept in mind. In Arabic *al 'aql* means to bind. It is this faculty which trusses man to Allah.⁶⁵

The stark legitimacy of the affair is that modern secular sciences are nothing but immoral and perverted dregs, remainder and leftovers of Islamic sciences which studied nature to observe beyond it. From the traditional Islamic perspective phenomena were symbols in the Book of Nature equivalent to the verse of Qur'an, whereas secular science sees in phenomena only facts. In the Islamic sciences uncontaminated comprehension was sovereign, whereas the inspiration, ethos and *raison d'etre* of secular science is the control, exploitation, misuse, disuse and abuse of nature.

Dr. Nasr shows that in every case the modern counterpart is a derelict residue of once transcendent science. He describes in his article "The Role of Traditional Sciences in the Encounter of Religion and Science: An Oriental Perspective", that astrology

⁶⁴*Ibid.*, p.13.

⁶⁵ S.H. Nasr, "Intellect and Intuition: Their Relations in the Islamic Perspective", *Studies in Comparative Religion*, Winter Spring, 1979, p.65.

originally comprised astronomy as well, but as the symbolist spirit became increasingly eclipsed the science bifurcated. On the one hand, astronomy became concerned with outward phenomena as facts; while on the other hand, astrology underwent various stages of degeneration so that its essential nature finally became lost altogether leaving only a derelict of itself. The attempts to resuscitate astrology in recent times have concerned themselves with the restoration of the most inferior aspect of the ancient science, namely divinization. Formerly and essentially, astrology was a science reflecting immutable truth. The object of its study was spiritual realization.⁶⁶ Alchemy like astrology considered the contingent world as a consequence and outward manifestation of what belongs to a higher order. Its teachings, as astrology's, were constituted in accordance with the laws of natural symbolism with the intention that their study should effect a transposition into the purely spiritual realm. To give a concrete glimpse of a traditional science and its associated symbolism Dr. Nasr says:

In a sense the terrestrial image of astrology may be said to be alchemy which also deals with those "intelligent" forms of matter called metals. That is why metals in fact possess the same symbols in alchemy as their astrological counterparts (for example Saturn, Lead, Sun, Gold, Moon, Silver), but traditional alchemy is not only a science or art which seeks to transmute various substances and metals into gold. Alchemy is one

⁶⁶ S.H. Nasr, "The Role of Traditional Sciences in the Encounter of Religion and Science: An oriental Perspective", *op. cit.*, p.19 – 20.

of the most extensive and encompassing of the traditional sciences. It is related at once to cosmology, medicine, the science of substances and psychology. Alchemy like astrology is based on a primordial vision of the earth as a living being in whose bosom and with the help of celestial influences grows the metals which stand outside of the natural order. The metallurgist is like gynecologists who delivers the metal from the womb of the earth and who, with the aid of spiritual forces is able to quicken the process by which this event takes place. The major traditions of alchemy namely the Alexandrian with its roots in the ancient Egyptian tradition, the Chinese, the Indian, the Islamic and the Western all grew out of this ancient science(or once again art if we remember that most traditional sources, both Arabic and Latin, call it art - *Sinā ah or ars*). These later traditions, despite the differences between them and including the Chinese, which emphasizes the gold-making juice as the elixir of immortality, all shared the basic principles which saw metals as special states of 'matter' with a common substratum and ready to be transmuted into the highest state which is that of gold provided the philosopher's stone be present. But they also knew that this external transmutation was no more than support for that inner transformation of the lead of the soul into the gold which alone can resist the withering influences of this world. They were also fully aware that this inner transformation was only possible through the presence of the spiritual master who is the real philosopher's stone. This does not mean that alchemists did not make use of external substances for support as so many Hermetic authors assert. Alchemy was certainly a way of ennobling matter, its relation to sacred art. But this also means that alchemy is not just a prelude to chemistry, that it is a science of the soul in its relation to the cosmos and making use of

external transformations for the sake of that inner transformation which is the ultimate goal of all traditional sciences.⁶⁷

This shows that eclipse of the symbolist understanding in modern times in the Muslim world, as well as the West has rendered the traditional sciences incomprehensible to almost all of our contemporaries, Muslims as well as Westerners. Thus study of such things really emerges value based Islamic Science.

Nasr has been one of the most outspoken critics of Western secular science and its effect on the non-Western world. In a number of studies, he has shown that the roots of modern science are traceable to a set of philosophical assumptions that mark the demarcation line between the medieval Christian and the modern West.

Taking the Scientific Revolution of the 16th and 17th centuries C.E. to be a turning point in the history of Europe, Nasr focuses on the process of the gradual demise of Christian thought and the rise of the secular view of the universe, and argues that the rise of modern science is not the result of some groundbreaking discoveries in scientific measurement and instruments but rather of a radical change in the worldview of modern man that emerged in Europe after the 16th century C.E. To substantiate this claim, Nasr identifies six dominant traits of modern science.

I. Secular view of the universe

⁶⁷ S.H. Nasr, *op. cit.*, p. 21.

This view sees no traces of the Divine in the natural order on the one hand, and denies any purpose to the universe on the other. Consequently, the teleological view of the universe, shared by all traditional civilizations, is rejected by modern science.

II. Mechanization of the world

Since modern science and philosophy claim to explain everything away in terms of scientific and rational analysis, the universe had to be constructed as a machine so that it would lend itself to the precise methods of analysis and measurement of modern physical sciences.

III. Rationalism and Empiricism

These are the only reliable methods of arriving at truth. In spite of deep contradictions between the two, the secular and reductionist methods of philosophical analysis are shared by both schools.

IV. Legacy of Cartesian dualism

The legacy of Cartesian dualism presupposes a complete separation between the knowing subject and the object to be known. One of the conspicuous results of this separation is the epistemological and spiritual Alienation of man from his natural environment and, in fact, from everything that may become the object of his knowledge.

V. Promethean view of Man

This view construes man as the measure of all things. Nasr contrasts with what he calls the “Pontifical man”, i.e., man as a bridge between heaven and earth.

VI. Exploitation of Nature

It is as a source of power and domination, which was the driving force behind the Industrial Revolution and the rise of capitalism.

Taken together, Nasr argues that these six postulates constitute the philosophical framework of modern secular science, which has led to scientism and demise of the sacred view of the cosmos on the one hand, and to such modern disasters as the environmental crisis and nuclear warfare on the other.

4.10 Dr. Taha Jābir al-Alwani(b.1935 C.E.)

Dr. Taha Jābir received his primary and secondary education in his native land and then graduated with an Honors Degree from the College of Shariah and Law at Al Azhar University in Cairo in 1959. From the same university he was awarded his Master's Degree in 1968 and a Doctorate in Usul al



al-Alwani

Fiqh in 1973. For ten years (from 1975 to 1985) Dr al 'Alwani was a Professor of Fiqh and Usul al Fiqh at Imam Muhammad ibn Sa'ud University in Riyadh.⁶⁸

Dr. Alwani participated in the founding of the International Institute of Islamic Thought (IIIT) in the USA in 1981, and is now the Institute's President and a member of its Board of Trustees. He is a founder-member of the Council of the Muslim World League in

⁶⁸ <http://www.islam-democracy.org>, s.v. "Dr. Taha Jabir al Alwani"

Makkah, a member of the OIC Islamic Fiqh Academy in Jeddah since 1987, and President of the Fiqh Council of North America since 1988.⁶⁹ Dr. Al-'Alwani has been a regular contributor to the American Journal of Islamic Social Sciences and a keen observer of intellectual trends throughout the Muslim world. Included among his works are the monumental edition of Razi's *al-Mahsul fi 'ilm Usul al-Fiqh*, *Contemporary Islamic Cultural Undertaking*, the *Horizons of Change and its Approaches*, *Crisis in Fiqh and the Methodology of Ijtihad*, *Ethics of Disagreement*, *The Rights of the Accused in Islam*, *Linking Ethics and Economics: The Role of Ijtihad, in the Regulation and Correction of Capitol Market* and *Source Methodology in Islamic Jurisprudence*. Recent publications include: *An Epistemological Perspective on the Political Dimensions to the Concept of Sovereignty*, *Taqlid and the Stagnation of the Muslim Mind*, *the Testimony of Women in the Law of Islam*, and *The Islamization of Knowledge: Yesterday and Today*.⁷⁰

⁶⁹ *Idem*

⁷⁰ www.islamonline.net. s.v. "Dr. al 'Alwani"

4.11 Dr.Abdul Qadīr Khan (b.1936 C.E.)

Dr. Khan was born in present day India, in Bhopal State on April 1, 1936 into a middle-class *Mobajir/Pashtun* Muslim family which migrated from India to Pakistan in 1952. He is a Pakistani scientist and metallurgical engineer widely regarded as the founder of Pakistan's nuclear program. He obtained the degree of Bachelor of



Abdul Qadīr Khan

Science in 1960 from the University of Karachi, majoring in physical metallurgy. He then obtained the degree of Master of Science (Technology) in 1967 from Delft University of Technology, the Netherlands, and a Doctor of Engineering degree in metallurgical engineering from the Catholic University of Leuven in Belgium in 1972.⁷¹ In 1976, he joined the Engineering Research Laboratories (ERL) in Pakistan and set up an industrial uranium enrichment plant. As a tribute to his services to Pakistan, during May 1981, the then

⁷¹ <http://www.draqkhan.com.pk/about.htm>, s.v. “Dr.Abdul Qadir Khan”

president of Pakistan, General Zia-ul-Haq renamed the Engineering Research Laboratories, Kahuta, as, Dr. Abdul Qadir Khan Research Laboratories (KRL).

The scientific vision and contribution of Dr. Khan has been recognized in several ways. As an active scientist and technologist, he has published more than 188 scientific research papers in international journals of high repute. He has been editor of a large number of books on metallurgy, advanced materials and phase transformation. His academic and scholastic activities have attracted the attention of number of western countries where he has delivered more than 100 lectures. His work on *Industrial Uranium Enrichment Plant* for peaceful application of nuclear technology has resulted in a breakthrough in the field of metallurgy and materials science. It is entirely due to his efforts that the process of enrichment of Uranium was successfully completed in Pakistan. This breakthrough ultimately resulted in the historic explosion of six nuclear bombs in May 1998. Not only was this but a significant development also made with the successful test firing of Intermediate Range Ballistic Missiles, Ghauri I, in April 1998 and Ghauri II in April 1999. Dr Khan has received honorary degrees of Doctor of Science from the University of Karachi in 1993, Doctor of Science from Baqai Medical University on (1998), Doctor of Science from Hamdard University, Karachi (1999) and Doctor of Science from the University of Engineering and Technology, Lahore in December 2000. For his contributions in the

field of science and technology, the President of Pakistan conferred upon Dr Khan the award of Nishan-I-Imtiaz 1996 and 1998. Dr Khan is the only Pakistani to have received the highest civil award of “Nishan-I-Imtiaz” twice. He is also a recipient of Hilal-I-Imtiaz.⁷²

A.Q. Khan's official career came to an abrupt end in March 2001, when he was suddenly forced out as director of the nuclear lab by order of President Pervez Musharraf. Though Khan was made a special adviser to the government, the reason for his dismissal reportedly coincided with concerns about financial improprieties at the lab as well as general warnings from the United States to the Musharraf about Khan's proliferation activities.⁷³ Khan came under renewed scrutiny following the September 11, 2001 attacks in the U.S. and the subsequent US invasion of Afghanistan to oust the fundamentalist Taliban regime in Afghanistan. It emerged that al-Qaida had made repeated efforts to obtain nuclear weapons materials to build either a radiological bomb or a crude nuclear bomb. In late October 2001, the Pakistani government arrested three Pakistani nuclear scientists, all with close ties to Khan, for their suspected connections with the Taliban.⁷⁴ On August 22, 2006, the Pakistani government announced that Khan had been diagnosed

⁷² <http://www.ias-worldwide.org>, s.v. “Dr Abdul Qadir Khan”

⁷³ <http://www.globalsecurity.org/wmd/world/pakistan/khan.htm>. However there is no substantial evidence to this accusation. It seems a political gimmick and imperialistic tendency to curb the potential and capability of the scientists born in the eastern part of the world.

⁷⁴ *Encyclopaedia Wikipedia*, s.v. “A. Q. Khan”

with prostate cancer and was undergoing treatment. On September 9, 2006, Khan was operated at Agha Khan Hospital, in Karachi. According to doctors, the operation was successful, but on October 30th it was reported that his condition had deteriorated and he was suffering from deep vein thrombosis.⁷⁵

4.12 Abdul Hamid A. Abu Sulayman(b.1936 C.E.)

Dr. Abdul Hamid Ahmad Abu Sulayman was born in Makkah 1355AH /1936AC. He was rector of the International Islamic University (IIU), Malaysia. He is Chairman of the Board, trustee, former president, and founding member of the International Institute of Islamic Thought (IIIT). He passed his BA



Hamid Ahmad Abu Sulayman

Commerce from the University of Cairo in 1959 AC and MA Political Science from the University of Cairo in 1963AC. He received his Ph.D. in International Relations from the University of Pennsylvania in 1393AH /1973AC. He became secretary of State Planning

⁷⁵ “Disgraced Pakistani scientist's health poor”, *Reuters*, October 30, 2006.

Committee, Saudi Arabia in 1963-64AC. He was Chairman of the Department of Political Science at King Saud University, Riyadh, Saudi Arabia from 1982-84AC. He became founding member of The Association of Muslim Social Scientists (AMSS) in 1392AH /1972AC, and was its former President during 1405-07AH /1985-87AC. He was Secretary General of the World Assembly of Muslim Youth (WAMY) from 1393-99AH/1973-79AC.⁷⁶

Dr. Abu Sulayman has written several articles and books on reforming the Ummah, including: *The Islamic Theory of International Relations: New Directions for Islamic Methodology and Thought*, *Azmat al 'Aqil al Muslim (Arabic)*, and *The Islamic Theory of Economics: Philosophy and Contemporary Means*.

Dr. Abu Sulayman has been instrumental in bringing about many international academic conferences and seminars. His book *Crisis in the Muslim Mind* is very special. It is a study, contemplation, and an analysis that has occupied him throughout his life. To him the problems of the *Ummah* demand understanding, study, and analysis. This book deals briefly with issues of methodology, the relationship between the Qur'an and the Sunnah, the time and space dimension in the Sunnah, and the rift between the political and the religious-Intellectual leadership of the Ummah. Dr Sulayman insists that the responsibility for instituting the needed change lies squarely on the

⁷⁶ Abdul Hamid A. Abu Sulayman, tras. by Yusuf Talal DeLorenzo, *Crisis in the Muslim Mind*, Herndon, Virginia USA, IIT, p. ii.

shoulders of Muslim Intellectuals. These are the ones who must break the psychological chains that have bound the Ummah for the past several centuries. They are the ones who must diagnose the malady for what it really is and then prescribe the right cure. Only then will Muslims be able to actualize the true Islamic way of life represented by tawhid, khilafah, and brotherhood. Finally, once Muslims have regained their dynamism courage, and morality they will not only improve their own lot, but contribute positively to world civilization as well.⁷⁷

4.13 Dr. C. M. Habibullah (b.1936 C.E.)

Dr. C. M. Habibullah is known as one of the most eminent Gastroenterologists of the country India. He was born on 12th October, 1936 at Chittor (Andhra Pradesh). He took his early education from Chennai. Afterwards, he did his MBBS from Guntur Medical College in 1958 and was awarded Gold Medals in Pathology and Surgery. He was awarded M.D. (General Medicine) in 1963 and D.M. (Gastroenterology) in 1972. Afterwards, he worked in a number of Hospitals and Medical Colleges in different parts of the country. He is associated with a number of institutions. He is a fellow of National Academy of Medical Sciences, American College of Gastroenterology, and International College of Angiology and also elected member of the Academy of Medical Sciences

⁷⁷ *Ibid.*, p.5-6.

(Gastroenterology) of the former USSR and nominated member of National Board of Examination and AIIMS. He is also Chairman, Academic Committee, All India Institute of Medical Sciences (AIIMS), New Delhi and President, National Association of Liver Study Group.⁷⁸

More than 80 major research papers by him have appeared in scientific journals. More than 106 papers have been presented by him at national and international conferences. His current interest is in liver cell transplantation therapy in cases of acute liver failure and vaccine action program in viral hepatitis cases. Several scholars have obtained M.D., D.M., and Ph.D. degrees under his guidance and many research projects have been completed. Besides, new drug trials have also been done.⁷⁹

4.14 Dr. S. N. A. Rizvi (b.1939 C.E.)

Son of Hakim S. Sultan Ahmed Rizvi, Dr. S.N.A. Rizvi was born in a family renowned for Hikmat, on 1 August 1939 at Amroha (District Moradabad, U.P.). After doing his graduation and postgraduation in Biochemistry, from AMU, he took admission in Medical College. Thereafter he completed M.B.B.S. and M.D. degrees in 1969 with gold medal in clinical thesis from Delhi University. He is considered one of the few authorities on Nephrology in India. He is a

⁷⁸*www.irfi.org, loc.cit.*

⁷⁹*Idem*

Professor of Medicine, Head of Nephrology and Endocrinology Division, Maulana Azad Medical College and associated Hospitals in New Delhi.⁸⁰

Dr. Rizvi, who has specialized in four fields-Endocrinology including Diabetes, Nephrology, Rheumatology and Internal Medicine, is supervising the Dialysis services at Maulana Azad Medical College and LNJP and G.P. Pant Hospitals since 1972. Since then about 24,000 patients have been given free dialysis service. It is the only Hospital in the country which provides free dialysis. It costs about \$600.00. The new dialysis unit is fully equipped with ten machines in non-infection units and two in Australia antigen units. The latter is the only unit available in the country. Dr. Rizvi reduced patient mortality from 69 percent to 36 percent; acute renal failure from 69 % to 36 %; and chronic renal failure from 100 % to 60 %. He reduced poisoning from 60 % to 4 %.

Dr. S.N.A. Rizvi, who has recently taken over as the head of the newly established Tetanus Department, has been honored with several fellowships and awards - Fellowship of AIID (All India Institute of Infectious Diseases), Bombay (Mumbai) in 1980 for his distinguished work on diabetes; Fellow of the Indian Academy of Medical Sciences, Delhi in 1983; Fellow of the Indian Society of Nephrology in Chandigarh in 1984; Fellow of the Indian Congress in Nutrition (International Nutrition) in 1985; Fellow of the Indian

⁸⁰*Idem*

Congress of Allergy and Immunology) in Delhi in 1986; Indian Congress of Physicians Fellowship in 1990 besides a number of national and international awards. He was recently been awarded by the Nobel Laureate Mother Teresa in recognition of his significant contribution to Nephrology. He was invited as a Guest Speaker to speak on several topics by national and international organizations. He has also been a life member of numerous scientific societies. His 220 papers have so far been published besides contribution of chapters in various books of medical sciences. He has also been the Associate Editor of the Journal of Indian Medical Association (IMA) of Medical Specialties, and member of the Editorial Board of the Journal of Indian Medical Association and also member of the editorial board of the Journal of Indian Society of Nephrology. He has got special interest in the poor. He spends Sundays at free medical camps in Delhi organized by the medical or voluntary organizations.⁸¹

4.15 Dr. Israr Ahmed (b.1940 C.E.)

Dr. Israr Ahmed, Director, Center for Promotion of Science, Aligarh Muslim University (AMU), Aligarh, is a distinguished scientist. He was born on December 19, 1940. After his graduation from Gorakhpur University in 1959, he pursued his post-graduation studies and earned a Ph.D. in Physics from AMU. He joined the

⁸¹*Idem*

AMU as a Lecturer in 1961. Since 1984 he is serving the Physics department as its Chairman.⁸²

Dr. Israr Ahmed is considered an authority on 'Theoretical Nuclear Physics and Quantum Scattering Theory'. Besides, he edits the AMU's Urdu monthly 'Tahzibul Akhlaq' and Hindi monthly 'Nishant' since 1986. His 48 research papers have so far been published in the international journals. A number of research scholars have been awarded M.Phil and Ph.D. under his supervision. Dr. Israr Ahmed is an associate member of the International Center for Theoretical Physics located in Trieste (Italy) headed by the late Nobel Laureate, Dr. Abdus Salam. He is a member of the New York Academy of Sciences and as well as the Indian Physics Association. He organized a conference on '*Religious Seminarae and Science Education*' on March 26-28, 1987 and DAE (Department of Atomic Energy) Symposium on Nuclear Physics December 26-31, 1989 at the AMU, Aligarh. He also conducted several introductory science courses for the teachers of Muslim religious seminaries. Besides, he is also a science fiction writer in Hindi, Urdu, and English.⁸³

⁸²Dr. Ibrahim B. Syed, "Contributions of Muslim Scientists to India", <http://www.irfi.org>, 2002.

⁸³*Idem*

4.16 Sayyid Waqar Ahmad Husaini

Dr. Husaini was employed in the universities of Malaysia and Saudi Arabia from 1972-1986 where he engaged in teaching, research, publications, international consultancy, and institution-building concerning Islamization of knowledge and higher education, particularly



Dr. Husaini

the sciences, engineering, and economics. However, he remained abreast of developments in his fields of interest from the secular U.S. and Islamic perspectives by returning to USA every year, and as a Visiting Scholar at Stanford University during 1974-75, 1981-82, etc. In the fall of 1974, he was a visitor at Harvard University and MIT which have highly developed programs in the history and philosophy of science and technology that provide demonstrative effect for Islamization. Dr. Husaini returned to USA permanently in late 1986; since then he has also been a Visiting Scholar, Stanford University, which has various “centers” and “programs” on ethics in science, technology, medicine, economics, etc.

Dr. Husaini has been a colleague of the founders and thinkers of IIIT (International Institute of Islamic Thought). The most prominent among them was the IIIT founder-President, the Martyr Isma'il Raji al Faruqi. The World Conferences on Muslim Education (the first four, 1977-1981) were organized by King Abdul Aziz University supported by the Government of Saudi Arabia, and in cooperation with the governments of Muslim countries, universities, and Islamic organizations. Such conferences started and developed the modern international movement for Islamization of knowledge and education. Dr. Husaini was the Reporter of committees in such conferences, and had prepared their recommendations. He had also prepared documents on Islamic science and education policies for the Muslim World and the international community as the Advisor (1979-1981) in charge of the Islamic Foundation for Science, Technology and Development (IFSTAD).

Dr. Husaini received his earliest inspiration for Islamization of knowledge and education from the Qur'ān and the Islamic intellectual legacy while he was a graduate student in engineering systems planning at Stanford University (1963-71). His Ph.D. dissertation, first published by Stanford's Department of Civil Engineering (1971), was selectively distributed in USA and the universities in Asia and Africa. It was published in 1980: *Islamic Environmental Systems Engineering: A systems study of environmental engineering, and the law, politics, education, economics, and sociology of science*

and culture of Islam. Its Malay and Indonesian translations were published in 1983. This book remained a pioneering work on Islamization of knowledge and higher education in the 1980s, and has continued to inspire their serious students.

In his work entitled *Teaching Islamic Science and Engineering: International Comparisons, and Case Studies From King Abdul Aziz University*, Dr. Husaini presents the goals, structures, and functions of the major elements in higher technical education. He shows how all scientists and technologists have successfully secularized or Marxianized even the “purely” technical disciplines. A major part of this book presents Dr. Husaini’s efforts and methodology in designing and teaching courses for Islamization of hydrology, water resources engineering, water law, economics and engineering economics. He describes in detail each course that he taught; these are presented as models for Muslims all over the world which they could adapt, within their own institutional setting, to Islamize the socio-humanistic and the natural and applied sciences and technology. Dr. Husaini has highlighted the department of socio-technical studies, college of engineering and applied sciences, King Abdul Aziz University; it was established as a unique institution in the Muslim world for systematic Islamic socio-humanistic studies and research in engineering and environmental design.

His *Islamic Science and Public Policies: Lessons from History of Science* gives an interpretative history of the birth, development and world

supremacy of Islamic science and technology as a lagging consequence of the genesis and development of certain Islamic principles and policies in the realms of Islamic metaphysics, epistemology and education, ethics and jurisprudence, politics and administration, economics etc. These constituted the paradigms of genuine Islamic orthodoxy that prevailed more or less during the earlier centuries. The marked decline of Islamic science and technology from about the eleventh A.H./seventeenth century C.E., quite perceptible even earlier, was brought about by Muslims themselves through the rise and consolidation of a pseudo-Islamic orthodoxy; its characteristics based on *tabrif* (perversion) of Qur'ānic paradigms and *takhsis* (reductionism) are also identified. Specific public policies vis-à-vis science and education through recommendations of some major international conferences are presented as guidelines for the contemporary rebirth of holistic Islamic science and technology. The author is highly critical of Muslims for their “blind imitation” of merely the institutional and infrastructural systems of Western and Eastern science and technology; this blind faith in their universalism and irrelevance of Islam, which is reduced to merely the “five pillars”, is a part of modern Muslim pseudo-orthodoxy which is responsible for the aborted Muslim science and technology. His other publications include:

1. *Qur'ān for Astronomy & Earth Exploration from Space*

2. *Islamic Thought in the Rise & Supremacy of Islamic Technological Culture*
3. *Water Resources Sciences and Engineering in the Qur'ān: Indexes, and Explanations of Selected Passages*
4. *Economics in the Qur'ān: Indexes & Introduction.*

Dr. Husaini asserts that during the last two centuries, and recent decades in particular, the most intensive efforts have been made to imbibe through blind imitation the Western and secular science and technology which contains only materialistic, institutional and infrastructural instrumentalities.⁸⁴ Commenting on medieval Muslim science and civilization he held that this period was an Islamic scientific method in terms of the Islamic philosophy of science, that is, the Islamic metaphysics, logic, epistemology, ontology, and ethics and values of science and technology.⁸⁵ Islamic integrity protects its believers by rejecting or at least resisting, the implantation of those sciences and technology which are infested with blatant secularism or camouflaged atheism. The pre-requisites for such Islamic science and technology are the rejection of pseudo Islamic orthodoxy and adoption of the genuine Islamic culture and public policies.

The battle for the rebirth of Islamic science and technology has just begun! In its genesis and development alone there is hope for us

⁸⁴S. Waqar Ahmad Husaini., *Islamic Science and Public Policies: Lessons from History of Science*, Aligarh India, Center for Studies on Science (CSOS), 1988, p.iii.

⁸⁵*Ibid.*, p.13.

as Muslims, freedom from recurrent disasters through defeats and humiliations during many a recent century, and an unmitigated blessing for mankind and all the biosphere creatures. When Prophet Muhammad (S.A.W.S) came with the *Qur'ān* among the Arabs, the Arabs had no known contribution or heritage of civilization. They lived in the Arabian Peninsula and were truly people of *Jāhiliyyah* (ignorance), morally and intellectually. They were best known for their interest in poetry, genealogy, a little trade, and much mutual plunder and tribal vendetta. A number of people literally counted on the fingers were literate in Arabic.⁸⁶ History witnesses that within short span of time Arab became torch bearer for others. What kind of metamorphoses did the *Qur'ān* and the living example of Prophet Muhammad (S.A.W.S) bring among the Arabs and the surrounding people and civilizations? How and when and where did these metamorphoses occur? Was the Muslim development based primarily on the philosophic and sociological assumptions of Islamic intellectual and ideological determinism, or socio-cultural change through economic and technological determinism? What specific ideas and institutions of Islam ushered in the new phase in the growth and development of all aspects of learning, human behaviour, and development? Are these Islamic ideas and

⁸⁶*Ibid.*, p.7.

institutions universal in validity and applicable in the contemporary Muslim predicament?⁸⁷

Dr. Husaini present answers for above questions in Islamic epistemology. The basic postulate of Islamic epistemology expounded in the *Qur'ān* is that Allah (S.W.T.) is knowable through the revelation of His will in the “two Books”, the *Qur'ān* or scriptural revelations in general, and the whole realms of nature and history.⁸⁸ The *Qur'ān* provides knowledge of basic value judgments and *al-ghayb* (unseen) truths. There are nearly 900 verses on water sciences and engineering, and 1400 on economics. Every verse reflects the principle of *tawhid*, integration of the concept of God with the disciplines presented in the verse. The word Allah (S.W.T.) and its derivatives occur nearly 2700 times and *rabb* (Nourisher) 970 times! Thus the *āyāt* (laws) of all disciplines originate from God Almighty, and must be based on the ideology of the *Qur'ān*.⁸⁹ The nature, cosmos, man and his socio-cultural system and history presents knowledge of demonstrable facts. These are knowable through natural reason in its various manifestations without the aid of Allah's (S.W.T.) revealed books including the *Qur'ān*. The two books thus are inter-related and inseparable forming an integrated

⁸⁷ *Idem*

⁸⁸ S. Waqar Ahmad Husaini., *op. cit.*, p. 17.

⁸⁹ Waqar A. Husaini, *Water Resources Sciences and Engineering in the Qur'ān, and Economics in the Qur'an*, www.iistd.com.

unity and a holistic system. Each Book does and should lead to and confirm the truths of the other.⁹⁰

The Qur'ānic epistemology thus discards the dichotomy in knowledge between the sacred and the secular, and creates a passion for learning of both the rational and “spiritual” or ethical sciences. This epistemology provides the bases for Islamic naturalism and empiricism. It creates a distinction between the ideological or religious and rational knowledge, while integrating them under a hierarchy. Thus the relation between revelation and reason, or Allah's will and human freedom is delineated. It also emancipates man from the common bane of religious such as the burdens of dogma, utter other worldliness and social irrelevance, dialectical theology and speculative metamorphosis and anti-social psychic and mystical experiences. These philosophic premises and epistemic concepts prepare man for technological development through the pursuit of useful knowledge and altruistic social action in an Islamic value orientation. One can see all these aspects of Islamic epistemology in the medieval Muslim works on education and the classification of knowledge such as those of al-Farabi, al-Ghazzali, Ibn Rushd, Ibn Khaldun and the later scholars.⁹¹ When this Qur'ānic epistemology first caught the imagination of people in the

⁹⁰ S. Waqar Ahmad Husaini, *Islamic Science and Public Policies: Lessons from History of Science*, *op. cit.*, pp.17-18.

⁹¹ *Ibid.*, p.18-19. See also Waqar Ahmad Husaini, *Islamic Environmental System Engineering*, ch.3.

seventh and eighth A.D centuries it swept away all those epistemic constraints which were blocking the souls and minds of mankind in all civilizations and created the “miracle” of Islamic science, philosophy and civilization. The birth and development of this Islamic epistemology and educational philosophy mark the birth and development of science, technology and socio-economic development in Muslim societies of middle ages.⁹²

Dr. Husaini held that the indoctrination of Muslims in this Islamic epistemology and philosophy and an educational and socio-cultural system based upon them are indispensable for the rebirth of Islamic science and technology among Muslims. This “indoctrination” means the institutionalization, acculturation and professionalization of Islamic science and technology.

Islamic Science and technology must be institutionalized in the curricula of Islamic schools and universities. The later must institute these subject areas in their pure, applied and inter-disciplinary aspects in specializations in the Islamic humanistic-social sciences also in a systematic and appropriate manner. The pursuit of a science and technology in the Islamic connotation as a profession must have the same “status” as any “traditional religious” profession. The concepts of innovation and imitation must be subject to through analysis as has been done through out the

⁹² *Ibid.*, p.20.

centuries by Islamic scholars. These concepts are meant to denote good and positive qualities. Thus imitation and innovation must be of a type Islamically lawful and good rather than the blind, slavish, absolute imitation and innovations which are alien to the letter and spirit of Islam or bad innovations. There is a large amount of literature on these and similar concepts produced by Islamic scholars since the 1st century A.H/7th century C.E as guidelines for Islamic development strategy. The demands of sectarianism in Muslims are a major cause of the increasing de-emphasis and neglect of science and technology in the education system. Islam inspired Muslims to distinguish between the facts of nature as the will or “sign of Allah”, and the values of ethics and morality which are the domain of the revealed will of Allah (Subhanahu wa Ta‘āla) in the Qur’ān.⁹³

The triumph of Islamic normative culture over the classical Greek and other Eastern and Western religions and philosophies brought about the discovery and development of the scientific experimental method and the sustained advances of medieval Islamic science, technology and socio-economic development. Medieval Islamic civilization was an age of “modernity” uniquely Islamic and quite different in fundamental disposition from the post-medieval and contemporary Western and Marxist-Leninist “modernities”. The former was an exquisite harmony among Allah,

⁹³ *Ibid.*, pp.21-28

nature, technology, man and society. The latter are disharmonious system due to a blatant but honest denial of Allah or philosophically untenable and hence hypocritical exclusion of Allah in secular affairs.⁹⁴

4.17 M. Ahmad (b.1941 C.E.)

Mr. M. Ahmed, IAS (Indian Administrative Service) officer, was born on November 2, 1941 at Adder (Kerala). He was the first rank holder in the University of Kerala in both B.Sc. (1961) and M.Sc. (1963) examinations in Mathematics. After a year as a lecturer in Mathematics in different colleges, he joined the Indian Administrative Service (IAS) in 1965. He was the Collector of Madras, Member-Secretary, Madras Metropolitan Development Authority, Secretary to the Government, Chairman and Managing Director of the Tamil Nadu Warehousing Corporation and Vice Chairman, Madras Metropolitan Development Authority.

Mr. M. Ahmed can tell in few seconds the day one was born, if he puts before him his date of birth. He has evolved new concepts in Mathematics, popularly known as "*Cardinal Geometry*."⁹⁵ The Cardinal Geometry is an innovative concept in Geometry, developed by Mr. Ahmed, enabling the creation and study of many symmetric mathematical curves and surfaces. The classical geometry

⁹⁴ *Ibid.*, pp.29-30.

⁹⁵It is a new type of Geometry, which deals with the Mathematical Curves, surfaces and coordinates.

knows only a few symmetric curves and surfaces like the circle, ellipse, parabola, hyperbola, cardioid, limacon, lemniscate, curves of Cassini etc., and some of their surfaces of revolution. Besides these curves, many lemniscates, blimps, crescents etc. have been generated by him. He has also written a treatise on the subject. According to Mr. Ahmed, the Cardinal Geometry theory could possibly be extended to the study of magnetism, motion of particles and bodies. It would have both theoretical and practical use in Engineering and Architecture. He is the author of a Calendar for all years from 45 B.C. to 1999 A.D. and an abridged version of it for 250 years.⁹⁶

4.18 Osman Bakar (b.1946 C.E.)

Osman Bakar was born in a small village near the town of Temerloh in the east coast state of Pahang in Peninsular Malaysia (1946). He received his high school education at the prestigious boarding school, Malay College Kuala Kangsar, dubbed



Osman Bakar

⁹⁶*www.infi.org, loc.cit.*

since British rule as “Eaton of the East.” Even at that early stage, Osman had a special interest in science and mathematics. After completing high school, he worked as a temporary teacher in Kuantan. In September 1967, he left Malaysia with a scholarship to study mathematics at Woolwich Polytechnic, London University. He graduated with a Bachelor’s degree in June 1970. He then returned to Malaysia to become a tutor at Department of Mathematics in the newly founded National University of Malaysia, Kuala Lumpur. After a few months, Osman returned to London in September on a study leave under the University’s lecturer training scheme to pursue postgraduate studies in Algebra at Bedford College, London University. The following year, he obtained his Master of Science.⁹⁷

The same year, Osman started his doctoral study at the same College, specializing on algebraic group theory. He became intensely interested in religion and philosophy. He began to read more books on Islamic thought and both Western and Islamic philosophy, than on algebra. He was particularly attracted to the writings of two great Muslim thinkers, the contemporary Iranian scholar Seyyed Hossein Nasr, and the medieval Iranian scholar al-Ghazzali. He admits that the writings of both thinkers exerted a profound influence on his intellectual outlook and development. Al-Ghazzali’s *Deliverance from Error* contributed greatly to his Islamic perspectives on religion and science. Three of Nasr’s works, *Introduction to Islamic Cosmological*

⁹⁷ <http://www.cis-ca.org/voices/b/bakar.htm>

Doctrines, The Encounter of Man and Nature, and Science and Civilization in Islam, according to Osman, had the greatest impact on his philosophical thought. It was clear that he had already embraced many of Nasr's intellectual perspectives on religion, philosophy and science. As a result of his new intellectual interests and several pressing circumstances, Osman terminated his doctoral study in mathematics to return home to National University of Malaysia in October 1973 to become a lecturer at the Department of Mathematics.⁹⁸

As a mathematics lecturer, Osman taught calculus and algebra. But because of his deep interest in religion and science, he was able to persuade the University's academic administrators to allow him to teach two courses related to the subject. One was an undergraduate course on science in Islamic civilization, the other on religion and philosophy of science. Both courses, which he helped to design and teach since 1974, were integral components of a group of courses on general studies that were made compulsory for all undergraduate students of the University. It was the first time that courses on religion, philosophy and science had ever been taught at Malaysia's institutions of higher learning. When the neighbouring University of Malaya introduced courses on history and philosophy of science within its "complementary science program" at the Faculty of Science in 1975, Osman was invited to

⁹⁸ *Idem*

be a guest lecturer. Convinced of better prospects there he moved permanently to University of Malaya in 1977 to become the first full-time teaching staff of the complementary science program. For many years he became the coordinator of the program. Apart from teaching the histories of Greek, Indian, Chinese, Islamic and medieval Western sciences, Osman also introduced various courses in philosophy of science such as religion and science.

In October 1981, Osman went to Temple University, Philadelphia to pursue his doctoral studies in Islamic philosophy of science under the supervision of Nasr. He wrote a thesis entitled *Classification of the Sciences in Islamic Intellectual History: A Study in Islamic Philosophies of Science* that has been published under the title *Classification of Knowledge in Islam*. The Malaysian edition was first published in 1992, and the United Kingdom edition in 1997. The book has been translated into Indonesian language and Persian. After obtaining his PhD, Osman was promoted to Associate Professor in 1989 and Professor in 1992 as Chair of Philosophy of Science, a post that he still holds. From July until December 1992, he was a Fullbright Visiting Scholar at Department of History of Science, Harvard University where he undertook research on Mathematics in Muslim Culture. In 1995, he was appointed the University of Malaya's Deputy Vice Chancellor in charge of academic and human resource matters. He resigned from the post in June 2000 to take up a new appointment at Georgetown

University, Washington DC as Malaysia Chair of Islam in Southeast Asia.⁹⁹

During the last 25 years, Osman has made a major contribution to the popularization of Islamic science and intellectual discourses on religion and science, and to the advancement of cross-cultural studies of history and philosophy of science. His intellectual contribution has had an impact, not only in his own country, Malaysia, but also in various parts of the Muslim world. He is the main founder of Malaysian Islamic Academy of Science established in 1977. He was its first Secretary-General (1977-1981) and later President (1987-1992). Among the objectives of the Academy is to promote studies and research in religion and science, particularly from the Islamic point of view. In 1991, he founded the Academy's bilingual biannual journal *Kesturi*, a publication dedicated to the pursuit of the unity of knowledge. He was the journal's first Chief Editor.

Osman's first academic paper was *The Problem of Malay-Muslim Progress in Science*, written in 1974 but presented in 1975 at the First Islamic World Conference in Science and Technology held in Riyadh, Saudi Arabia. The paper dealt with certain issues in religion and science, and proposed that the problem of Malay-Muslim backwardness in science education should be resolved within the

⁹⁹ *Idem*

Islamic intellectual and cultural framework. It was published in the Proceedings of the Conference. In the subsequent period until his departure for his doctoral study in the United States, all of Osman's works were written in Malay. The majority of these works deal with the subject of Islam and science, covering such issues as the meaning and significance of Islamic science (1976), Islamic conceptions of science (1978), the relationship between science and spiritual values (1979), and the fundamental differences between traditional Islamic science and modern science (1978). One significant work belonging to this period was written as a discussant of the paper *Islam's Contributions to World Culture* (in Malay) presented by the famous Indonesian philosopher, Sutan Ali Takdir Alisjahbana, at an International Seminar on Islam and Malay Culture, held at the National University's temporary campus in Kuala Lumpur. All seminar papers, including Osman's critique of Alisjahbana were published as a book by the Ministry of Culture, Youth and Sports (1977).¹⁰⁰

It was Osman's *Conception of Science in Islam* (in Malay) that had a considerable impact on Muslims in Malaysia, especially among students. It was presented in 1978 as the main paper in the first national seminar (organized by Islamic Academy of Science) ever to be held on Islam and science. The work was published soon afterwards in *Risalah* (1978), a newsletter of the influential Muslim

¹⁰⁰ *Idem*

Youth Movement of Malaysia (ABIM). It was widely distributed and read by Malay students, including those studying abroad. The Australian Federation of Malaysian Students' Association published it in its *Majalah AFMSA* (1978). In this work, Osman proposed that science as conceived and cultivated in Islamic civilization exhibits characteristics that differ significantly from those of modern science. One major difference between Islamic science and modern science is in their methodological approaches to the study of nature.

The next phase of Osman's academic life, beginning with his PhD studies at Temple University, saw a tremendous increase in his intellectual output. A total of ten books, six in English and four in Malay were published. More than seventy papers, mostly in English, appeared in journals and magazines, including papers that he had written when he was a PhD student. These books and articles dealt with a wide range of subjects in religion, philosophy and science. His discourse on Islam and science covered such topics as metaphysical and cosmological foundations of science, methodology, evolution, bioethics, philosophy of medicine, natural theology, and cognitive psychology. Osman claims that the philosophical perspectives on Islam and science that he acquired during his mathematics postgraduate studies in London have not undergone any fundamental development or change, but have basically remained the same until now. His claim seems to be confirmed by the similarity and the continuity of thought in the

philosophical contents of his pre-doctoral and post-doctoral studies.

Many of Osman's works on Islam and science are widely read in various parts of the Muslim world, especially in Indonesia and the Indian sub-continent. His most popular book is *Tawhid and Science* (1991), which has been translated into Indonesian Language and Albanian. Chapters of the book have been translated into the major languages of the Muslim world, including Arabic, Persian, Turkish and Urdu. It enjoys the distinction of being the most reviewed of all his books. In a sense, *Tawhid and Science* depicts the depth and breadth of Osman's intellectual concerns with issues in Islam and science. What it calls 'Islamic science' is none other than that science which embraces the totality of the mathematical and natural sciences, including psychology and cognitive science, which have been cultivated in Islamic culture and civilization for more than a millennium, beginning in the third century of the Islamic era (the ninth century of the Christian era). Those sciences can very appropriately be called Islamic science, because, conceptually speaking, they are organically related to the fundamental teachings of Islam, the most important of which is the principle of *tawhid*. The science of tawhid is theology in the real sense of the word.

Another of his popular books, an edited work, is *Critique of Evolutionary Theory* (1987).¹⁰¹

In *Tawhid and Science* and several other writings, Osman maintains that Islamic science shares with modern science the rational nature of its language, the adoption of scientific and experimental methods of inquiry, and the international character of its scientific practices, organizations and institutions. This is understandable since historically speaking, modern science is the immediate successor of Islamic science. In many of its disciplinary characteristics, modern science owes a lot to Islamic science. But in many other characteristics, it marks a clear departure from its predecessor. There are many important differences in the philosophical principles on which the two sciences are founded. The metaphysical and cosmological foundations of Islamic science have either been rejected or neglected by modern science. Even at the level of epistemological, ethical and moral principles, major differences are discernible between the two sciences. Consequently, these sciences have come to adopt theoretical and practical goals and methodological principles that are different in several respects.

Osman's interest in religion and science is not confined to Islamic viewpoints. It covers the viewpoints of the world's major religions. As a postgraduate student at Temple University's

¹⁰¹ *Idem*

Department of Religion, then probably the world's best department of its kind, Osman was well exposed to the study of world religions under distinguished professors of religion. At the University of Malaya, he has taught third-year science students courses on religion and science from the perspectives of the world's major religions, which happen to exist also in Malaysia. He is particularly interested in exploring the encounter of religion and science on such issues as cosmic design, meaning of intelligence both terrestrial and extra-terrestrial, cognitive psychology, evolution, quantum physics and consciousness, bioethics, and genetics. In 2001, he has been appointed a member of the Religion Working Group on Genetically Modified Food at University of Pennsylvania's Center for Bioethics.¹⁰²

4.19 Muhammad Zaki Kirmani (b. 1950 C.E.)

Muhammad Zaki Kirmani was born on June 28, 1950 in a village in District Bulandshahr (UP) India. His primary education was at the village school and he graduated from Aligarh Muslim University (AMU) in 1965. He received a Ph.D. Degree in Heterocyclic Chemistry in 1979 from Indian Institute of Technology (IIT), Delhi. Currently he is member of the Governing Council of MAAS, Member Editorial Board, *Omega International Journal of Science and Religion*, Member International Advisory Board, *Periodical Islamic*,

¹⁰² *Idem*

Kuala Lumpur(Malaysia), Convenor, *Science Talent Search Programme*, Muslim Educational Trust, Delhi, and Member Editorial Board “The Encyclopaedia of the Quran”, Delhi.

Kirmani’s lifelong quest in the Islam and Science discourse began in 1979. Along with a group of friends who were all interested in taking new initiatives on thinking Islamically about science and its related issues, *Centre for Studies on Science* (CSOS) was founded at Aligarh in 1982 for conducting research and training on related issues. This was followed by the formation of The *Muslim Association for the Advancement of Science* (MAAS) in 1983 for cultivating similar ideas among working scientists.

His first major work on Islam and Science was the *Journal of Islamic Science*, which was first published in 1985 from Aligarh, U.P., (India). He was editor of the journal until 1998. In an editorial given in the *Journal of Islamic Science* ,“ From Chaos to Order ”, Zaki Kirmani calls for us to broaden the scope of progress to provide for the overall well-being of man and to harmonize material prosperity with primordial truth. Further, he tells us in another article “New ideologies in science ”, that the philosophical foundation of science and technology is still taken as sacrosanct and is still considered

neutral, objective and universal.¹⁰³ This means science is not neutral simply because it is directed by the politico-industrial complex.

His most recent work *The Qur'an and the Future of Science* invites the attention of modern intellectuals to find ways for a humane and spiritually strong base for the development of science and technology. It also deals with questions related to science and technology in the global matrix and the role of Qur'anic values in dealing with the emerging problems.

In experimental science Zaki Kirmani has demonstrated:

1. Unusual products in Mannich Reaction with 2-Methyl-3-substituted -4(3H)-Quinazolinones.
2. Selective Bromination of 2 α -Methyl -3-(p-tolyl-4(3H)-Quinazolinones by N-Bromosuccinimide catalysed by benzoyl peroxide or Hydrobromic Acid.
3. Mass spectral fragmentation of some 2,3- disubstituted 4(3H)-Quinazolinones.
4. Studies on the reactivity of 2-Methyl- 3 phenyl- 4 (3H)-Quinazolinone.
5. Transformation of 4(3H)- Quinazolinones to 2,4- Quinazolinones.
6. Mass spectra of disubstituted Quinazolinones.

¹⁰³ *MAAS Journal of Islamic Science*, Aligarh, Muslim Association for the Advancement of Science, Jan 1985/1405 H, Vol. 1, No. 1, p. 71.

7. New reactions of 2- Bromomethyl-3-Phenyl-4 (3H)- Quinazolinone

The development of his ideas in Islam and science and their relationship to modern science was gradual. He maintains that in the first phase of his intellectual shift from pure science to Islam and science he could not see, like many other Muslim Scholars, beyond comparing scientific information and vision with the scientific knowledge often found in the *Qur'ān*. However, gradually his vision expanded to visualising a strong philosophical and sociological base for science, which could be developed and articulated on the basis of the Qur'ānic thoughts. He believes that if this basis could be objectively presented, it will significantly contribute to the growth of a healthier modern science and technology on the one hand, and would remove many misunderstandings among the Muslims on the other. Its popularization among Muslims and especially their religious educational institutions, would improve and revitalize Muslim affinity to science and their potential for the promotion of modern science.

Kirmani's major areas of interest in Islam and science have been philosophy, sociology and methodology of science, science policy and ethics. The broader areas of science ethics which include questions of philosophical and sociological import are of special interest to him. The dominant theme in Kirmani's published work is critical evaluation of the impact of science on life and society and the methodology of scientific studies.

He claims that the most important features of modern science are its stress on:

1. total intellectual freedom in doing science
2. solving problems on the basis of scientific knowledge
3. the scientific method as the most authentic and dependable way of knowing
4. its superiority on other forms and means of knowing and
5. its acceptance and rejection in matters intellectual, social, religious and spiritual on the basis of the yard stick of science.

From the Islamic point of view 'Nature' is *ayah* (a sign of God) and this imparts an element of mild sacredness in all natural forms and manifestations. Furthermore, and in fact more important, Islam encourages every form of the human-nature interaction simultaneously, making it prone to accountability. This interaction is, therefore, a spiritual act. It is restrained and controlled interaction with a sense of responsibility and accountability both to the society and to the highly developed conscience.

Kirmani says that today's science is technically the continuation of Islamic tradition, but it is characterized by dominant ethics and philosophical views which are non-Islamic in origin and are thus at times un-Islamic in character. Since science in its essence is the study of matter and material phenomena via methods based on sense perception, modern science, technically speaking, is in fact

an extension of the Islamic scientific tradition, which was dominant until fifteenth century C.E. The Qur'ānic teachings, which comprise instructions for man's behavior and his relationships with nature and various forms of creation around him, and also provide guidance and instructions in shaping man's creative and intellectual impulses, together have woven the socio-ethical matrix in which Islamic science tradition actually flourished and prospered. However when Islamic culture and civilization entered Europe, the socio-ethical component of science, being essentially religious and ideological, was consciously or unconsciously not accepted in totality and only the technical aspect survived. The ethical component was initially replaced by the Judo-Christian tradition which, for a variety of complex reasons, transformed gradually and became completely secularized. On Islamic Science his list of publications and their central ideas are:

1. 'On the parameters of Islamic Science' in *Quest for New Science*, ed. by Rais Ahmad and S. Naseem Ahmad.

Points out to the nature of crisis science is suffering from and the need to do remedial measures.

2. "New Ideologies on Science" in *Journal of Islamic Science*, Vol.1, No.1, p.67 (1985).

Briefly introduces issues which arise as a result of increasing infringement of science in cultural boundaries.

3. "Ghazali Needs Revival" in *J. Islamic Science*, Vol.1, No.1, p. 83 (1985)

Imam Ghazali, a prominent philosopher of Islam, took a position when Greek philosophic thoughts were introduced into Islamic civilization and created ripples in the Islamic intellectual and theological circles. Ghazali's position is considered to be Islamically authentic and may be able to contribute in similar situations today.

4. "A Critique of Criticism on Science" in *J. Islamic Science*, Vol.1 No.2, pp. 39-51 (1985)

Discussion and analysis of various trends observable in the contemporary criticism of science and technology. It is obvious that the measures suggested to solve the problems caused by science and technology do not have the potential to grapple with the issues. Mere alterations in the socio-economic and socio-political structure of the day, as suggested by the critics, are not sufficient to meet the individual and societal problems of the time. What is needed, in fact, is a new world view and a new epistemology of science and technology.

5. "Muslims Lag in Science and Technology Activity" editorial in *J. Islamic Science*, Vol.2, No.1, p.4 (1986)

Muslims lag in science and technology activity and their lack of involvement in science and technology has more than one reason. One important reason is the fact that they find little spiritual stimulation and motivation to work for modern science. This editorial analyzes this view in terms of social perspectives of the Indian sub-continent.

6. “Imitative Innovative Assimilation: A Critique of Waqar A. Husaini’s Scheme of Contemporary Islamic Science and Technology Rebirth”, *J. Islamic Science*, Vol.2, no.2, pp.69-74 (1986)

The author has critically evaluated the idea of imitative - innovative assimilation given by S. Waqar A. Hussaini in his thought-provoking book *Islamic Environmental Systems Engineering*. There is no doubt that Muslims in the medieval period borrowed science from Greece, Iran and India without losing their Islamic character, but today the situation is entirely different. This situation demands a re-classification of knowledge on the basis of the Islamic theory of knowledge and societal needs before attempting to assimilate any facet of western science and technology into Islamic society.

7. “How to Begin with the Contemporary Islamic Science” editorial in *J. Islamic Science*, Vol.2, No.1, p.5 (1987)

This editorial outlines preliminary steps required to develop Islamic science. (1) Articulation of the Islamic view of Nature and its comparison with dominant western view (2) Internalization of science and identification of factors which may psychologically stimulate the believers to scientific activity and (3) development of norms and fixation of priorities of research and development etc.

8. “Issues in Islamic Science” in *J. Islamic Science*, Vol.3, No.2, pp.41-69 (1987)

Viewpoints of several authors are critically examined and reviewed. Three distinctly separate viewpoints regarding Islamic

science have been identified. These views have their origin in the viewpoints of the individual authors with regard to Western science. Science and technology being neutral, the Islamic consciousness and commitment of the Muslim scientists would, in all probability, render their scientific activity Islamic. This constitutes one of the points of view. According to the second point of view, the neutrality of science and technology will be determined by Islamic shariah and the resulting scientific activity will be Islamic science. The third view obviously indicates that the Western science is biased towards western cultural values and in order for a scientific activity to be Islamic it must have roots in Islamic concepts of Nature, Man, knowledge and values.

9. “We do Need Science But....” in *J. Islamic Science*, Vol.7, No.1, p.5-8, (1991)

The need for and the significance of developing excellence in science and technological skills is highlighted by making comparisons with the nature of skills which Muslims possessed during the early period of Islam. It has been argued that Muslims in the Prophet’s (S.A.W.S) time countered their opponents with a qualitative equivalence in skills. Strength of *Iman* (faith) offset their numerical inferiority. The qualitative equivalence in skills is not available today and it is necessary to achieve such a level for survival and good living.

10. "Islamic Science Moving Towards New Paradigm" in *An Early Crescent: The Future of Knowledge and Environment in Islam*, ed. by Ziauddin Sardar (London: Mansell, 1989)

Zaki Kirmani has evaluated the major works in the sphere of Islamic science to date and dealt with the

1. Nature of the crisis in the dominant western mode of science.

2. Internal stimuli for Islamic science.

3. Approaches in Islamic science.

11. "An Outline of Islamic Framework for a Contemporary Science" in *J. Islamic Science*, Vol.8, No.2, (1992)

There is a genuine demand among much of the world population for science attuned to an Islamic social ethos. Its genuineness lies, in part, in the evidence which favours a distinctive nature of scientific activity in the medieval Islamic lands, as provided by modern historians of science. In addition to economic and political factors, this demand is rooted in a sense of frustration caused by modern science in certain vital areas of life and human activity. Its hostility to nature, culture and ideologies has served to increase this frustration and has led several scholars to contemplate their reorientation on Islamic lines. This reorientation is likely founded on certain basic assumptions e.g. there is moral order in the universe, the objects and various phenomena under scientific study are *Ayat* (signs) of Allah's power, study of these *Ayat* is a spiritual function and religious duty, etc. The Qur'an shapes the attitude of

scientists and gives meaning to findings and discoveries. This approach and the meaning derived from it originates in the concept of Reality to which the noble Qur'an points. The scientists who ponder over and investigate with this perspective are held in high esteem by the Qur'an. Scientific activity in this manner is socially obligatory in Islamic jurisprudence and is the means of achieving Allah's pleasure. The basic elements with which an Islamic scientific activity can be developed today is presented.

12. "Rebirth of Islamic Civilization, Science and Muslim Intellectual" editorial in *J. Islamic Science*, Vol.12, No.1 (1996)

An attempt has been made to identify and contrast basic ideas in the approaches of three modern exponents of the Islam and science debate, Sayyid Hussain Nasr, Ziauddin Sardar and Naquib al-Attas.

13. "Can Science Dispense with Religion?" a written interview in *Can Science Dispense with Religion*, edited by Mehdi Golshani 1998 (Tehran: Institute of Humanities and Cultural Studies) Iran, p. 129-134.

Topic discussed are: definition of science and religion; possibility of conflict between the definition of the two; in which domain of the two the conflict may arise; the ground of the conflict; role of religion in the development of science in the west; possibility of a religious science; can dispense with religion? ; can the domain of activity of science and religion be separated?

14. "Science and Technology and the Revival of Islam in Contemporary World" in *J. Islamic Science*, Vol.12, No.1 (1996)

A general understanding of nature and the scope of scientific and technological development are profoundly different and their role in shaping man's thinking and directing the course of socio-political and economic changes in modern society is significant. In view of this, the author asserts that the revival of Islam, being a phenomenon of attitude and civilization, can't ignore science & technology, and it should be taken extremely seriously in designing strategy and course of action for Islamic revival. The author relates this assertion to the early period of Islam and emphasizes that the vast difference in power related to science and technology that exists today was not observed between Islamists and their opponents during the time of the Prophet. A sort of parity in power, i.e. S&T, has become, rather, a religious necessity which can't be achieved merely by imitating the modern west. An Islamic worldview is required to motivate a Muslim's mind to be religiously involved in pursuit of science.

15. "Islamic Science Debate: Entering the New Millennium" in *Hamdard Islamicus*, Vol. XXIII, No.4, pp.7-36 (2000)

Nature and dimensions of current criticism of science are introduced. The response of Muslim thinkers and the positions they have taken with regard to the criticism are discussed by classifying them into schools of Islamic sciences as science in Islamic perspective, Islamic Science: the fundamentalists, and Aligarh school which amalgamate Islamic science debate with missionary traits. The shape of science in these perspectives has been discussed.

16. “The Qur’an and the Future of Science (Part-I) ” in *Global Religious Vision*, Vol.1 No.3, January, (2001)

The nature of knowledge contained in the Qur’an is compared with the one generally employed in the scientific investigation. Nature of scientific environment the Quran creates, and the basic elements of the philosophy of science in Islamic perspective have been outlined.

17. “The Qur’an and the Future of Science (Part-II)” in *Global Religious Vision*, Vol.1 No.4, July, (2001)

Second part discusses the basic thoughts of sociology of science in Islamic perspective, potentially scientific information in the Quran, the Quran and the future of science, and, the features and the shape of the debate on Islamic science currently going on.

4.20 Ziauddin Sardar (b.1951 C.E.)

Ziauddin Sardar was born on 31 October 1951 in Divalpur, Northern Pakistan. As a small boy, he migrated to London, Britain, following his father who had established a foothold there a few years before. He studied physics and information science at the City University in London.



Ziauddin Sardar

He is a writer, cultural critic and Visiting Professor of Post-colonial Studies at the city University, London.¹⁰⁴

As an information scientist, he worked at the Hajj Research Centre of King Abdul Aziz University, Jeddah, where he developed a simulation model for the performance of the pilgrimage to Makkah. He simultaneously wrote books and worked on evenings as a journalist. He then migrated again to London, and worked for science periodicals like *Nature* and *New Scientist*, before joining television as a reporter. After this, he became consulting editor of *Inquiry*, a Muslim magazine. He set up a “Centre for Future Studies at the East-West University” in Chicago. Between 1994 and 1998, he was visiting professor of science and technology policy at the Middlesex University.

Since 1985, Sardar has worked as an independent programmer and writer. He has written about many contemporary issues. He has published some 37 books, and over 200 articles, essays, and reviews. Since 1999, he has been editor of “*Futures*”, the monthly journal of policy, planning and futures studies, co-editor of “*Third Text*”, the critical journal of visual art and culture, and a regular contributor to the British current affairs magazine “*New Statesman*.”¹⁰⁵ His views on the relationship between Islam and science were first articulated in

¹⁰⁴ Ziauddin Sardar. “Islam Must Stand up to Itself”, *www.newint.org*.

¹⁰⁵ *www.others.com*, s.v. “Ziauddin Sardar”

the early 1970's when it seemed as if a great revival of the Islamic intellectual tradition was in the making. In 1980, Sardar published an article in the *New Scientist*, "Can science come back to Islam?" Two years later, this was followed by another article, "Why Islam needs Islamic Science?" in which he discusses that Islamic Science is an offshoot of Islam having its own philosophy and sociology. Its value laden character makes it different from Western counter part. Islamic Science promotes the values of the worldview of Islam whereas the modern science promotes the values of Western culture and civilization. Because of this major difference modern science has yet not taken roots in Muslim societies. Moreover the bankruptcy of modern science on spiritual, moral and social levels has developed an immense need of Islamic science for Muslim societies. To make Islamic science operative, the fruitful step will be that the Islamic science must be based on the frame work of Islamic values. These values are, *Tawhid, Khilafah, 'Adl, zulm, Ibadah, 'Ilm, Halal, Haram, Istislah and Dhiya*.¹⁰⁶

These short articles were followed by an edited work, *The Touch of Midas: Science, Values and the Environment in Islam and the West*. This work concluded that the issue of science and values in Islam must be treated within a framework of concepts that shape the goals of a Muslim society.¹⁰⁷

¹⁰⁶ Ziauddin Sardar. "Why Islam needs Islamic Science", *Science and Technology in the Islamic world*, vol.5, No.1, 1987, p.12-22.

¹⁰⁷ *New Scientist*, 15december 2001.

Ziauddin Sardar has recognized the inaptness of proposing that science and technology can be sufficiently Islamized by their simple incorporation in an Islamic polity. The idea of science in an Islamic polity supposes that because a man is a Muslim, his attitude and approach to science will be different, that is, his science will be Islamic. Sardar remarks that this is the ultimate intellectual blindness, because such a view ignores the fact that science is an international enterprise inseparably tied up with politics and profane ideology, one either works within or outside. Research priorities and emphasis are set not by individual scientists but by national governments, external influences – like the US military – industrial complex – aid agencies and the international culture of science. There is no way for individual scientist working in his laboratory to safely conclude that his particular piece of research will not serve a socially disruptive purpose. Sardar points that half the communities of scientists worldwide are engaged in work related to social control by either domestically repressive regimes against their own population or externally as war. He further explains that this involvement is not simply direct, as in the case of weapons production, but also indirect. The indirect involvement is the industry support to the direct involvement that is the war machine.¹⁰⁸ It is equally blameworthy as is confirmed by the Hadith: “He who abets a bad deed even by half a word is partner in it.” Within this

¹⁰⁸ Ziauddin Sardar, *Explorations in Islamic science*, New York, Mansell, 1989, pp. 49-61.

system one cannot take an Islamic approach or argue that the reductive methodology of science will lead Muslims, by virtue of their religion and beliefs to make environmentally sound socially beneficial contribution to Islamic societies. Nor indeed, one can take refuge in academic isolation and blame ‘others’ who have soiled the fair name of science by applying its results to evil deeds. Such breath-taking disregard for the ways in which the total, unified system of Western Science works is a major factor why genuine problem solving methods and socially relevant research never taken root in Muslim countries.¹⁰⁹

Sardar pleads well that we can not conceive of science in an Islamic polity. He argues in favour of Islamic Science on the basis of the evidences provided by philosophers and historians of science, sociologists and anthropologists of knowledge. They all firmly believe that science is not neutral, objective and universal.

The scientific method is value laden. Observation is theory dependent, certain values direct science in certain direction and facts in science are constructed rather discovered. In his own words, ‘scientific facts are created within a well defined theoretical structure and a social process and have significance and meaning only within this structure and process.’¹¹⁰ If such is the case why Islam having

¹⁰⁹*Ibid.*, p. 61.

¹¹⁰*Ibid.*, p. 55.

different values, cannot then create science quite different from the Western one.

Sardar has emphatically argued in favour of Islamic Science exclusively in his *Explorations in Islamic science*. Here he has elaborated that different civilizations have different science with distinctly different approach, methodology and epistemology. Islamic science has its unique character. It is its insistence on multiplicity of methods which gives Islamic science a characteristic style with synthesis as its main feature. This unique nature and characteristic style means that while Islamic science values systematic, rigorous search for truth, it is not “objective” in a clinical sense – it does not kill off all it touches. Concerns for social welfare and public interest, promotion of beauty and a healthy natural environment, as well as systematic observation and experimentation and rigorous mathematical analysis are hall marks of Islamic science in history. As such, Islamic science is subjectively objective: that is, it seeks subjective goals within an objective framework. The subjective, normative goals include seeking the pleasure of Allah, the interests of the community, promotion of such eternal Islamic values as *adl* (justice), *ibadah* (worship) and *khilafah* (man's trusteeship). This contrasts sharply with naive inquiry which is based on emotions, dogma, bias and prejudices. Islamic science has nothing to do with the magic and the occult: it does not seek to introduce anarchy and dogmatism into the pursuit of knowledge; neither does it seek to

impose the method of one discipline on to another. It simply seeks to give equality to all methods of inquiry, and. promote research and development within a framework of ethics and values which by nature are subjective. It therefore, also contrasts radically with Western science which excludes all other branches of knowledge and is based on a single method which is considered to be outside human values and societal concerns. Islamic science, on the other hand, seeks a total understanding of Reality. It is thus a very holistic enterprise.¹¹¹

Sardar declares that every civilization is heir to two types of knowledge – “the self-evident truths require no proof” which he calls “axiom” and another type which he vaguely defines as “a dynamic and volatile body of scientific knowledge.” Sardar argues that Islamic Science flourished because of its broad base of axioms. He remarks that “Occidental civilization has few axioms” and he indicates that these are “negative” in effect. Then he lists some of these axioms: “. . . that Reason is Supreme, nature is there to be dominated, the purpose of science is to solve all problems and that the only sciences that can do this are that of the Enlightenment”. Sardar further insists, “The revival of Islamic science in our time means contemporary science will get a much needed ethical base”

¹¹¹*Ibid.*, pp.56-57.

and what he implies is that because Islamic sciences are possessed of axioms these would be infused into the modern sciences giving it an “ethical base”.¹¹²

He has strongly pleaded for Islamic science as opposed to Western science which on account of its “inherent destructive”¹¹³ nature cannot meet the physical, cultural, ethical and spiritual needs and requirements of Muslim societies. His assumption about Western science is that it has developed within its own conceptions of time, space, man and nature and it attempts to solve its own problems on priority basis. For Muslims the conceptions of man, nature, time and space are different from those of Western ones, so also their needs, aims and priorities. Therefore they must develop Islamic science taking into account all these factors. Moreover he has also identified certain Islamic values viz *tawhid*, *kehilafah*, *‘ibadah*, *adl*, *zulm*, *halal* and *haram*, *istislah*, *istehsan* and *dhiya* ¹¹⁴and so many others which should also be taken into account in the development of Islamic Science.

Thus Sardar's arguments for Islamic science precisely imply that it is obviously the need of Islamic civilization. In fact he pleads for Islamic science from the perspective and vantage point of the

¹¹² *MAAS Journal of Islamic Science*, *op.cit.*, Jan 1985/1405 H, Vol. 1, No. 1, pp. 40 – 41.

¹¹³ Ziauddin Sardar. “Arguments for Islamic Science”, *op. cit.*, p.57.

¹¹⁴ Ziauddin Sardar, *Explorations in Islamic science*, *op. cit.*, pp.64-67.

science which is responsible for the development of a society, whose processes and methodologies incorporate the spirit of Islamic values and which is done not for man's own sake but for the pleasure of Allah. Therefore, Muslim countries which are dependent on developed countries can become independent and have powerful and prestigious position only when they develop their own science i.e. Islamic Science.

4.21 Harun Yahya (b.1956 C.E.)

Adnan Oktar, who writes under the pen-name Harun Yahya, was born in Ankara in 1956. He studied Arts at Istanbul Mimar Sinan University and Philosophy at Istanbul University. Since the 1980s, the author has published articles and more than 150 books



Harun Yahya

on political, faith-related and scientific issues. His pen-name is made up of the names “Harun” (Aaron) and “Yahya” (John), in memory of the two prophets who fought against lack of faith. The Prophet's seal

on the cover of the author's books has a symbolic meaning linked to their contents. This seal represents the Qur'an as the last Book of Allah (Subhanahu wa Ta'āla) and the Prophet Muhammad (Sallallahu 'alaihi wa Sallam) as His last messenger. Under the guidance of the Qur'an and Sunnah, the author makes it his main goal to disprove each one of the fundamental tenets of godless ideologies and to have the "last word", so as to completely silence the objections raised against religion. The seal of the Prophet is used as a sign of his intention of saying this last word. Harun Yahya's books are available in English, French, German, Italian, Portuguese, Urdu, Arabic, Albanian, Russian, Serbo-Croat (Bosnian), Uygur Turkish, Malay, and Indonesian. There is a wide readership in India, the United States, England, Indonesia, Poland, Bosnia, Spain and Brazil.¹¹⁵

Harun Yahya's vision revolves around one goal: to convey the message of the Qur'an to people and thus to encourage them to think about basic faith-related issues, such as the existence of Allah (Subhanahu wa Ta'āla), His unity and the hereafter, and to remind them of some important issues.¹¹⁶

Harun Yahya says that Darwinism has caused many people to doubt the existence of God and many have been led by Darwinism to completely abandon their faith. The theory of evolution, he says, is "a fairy-tale, a great deceit, that is totally at variance with the real world".

¹¹⁵ <http://harunyahya.com>, s.v "Harun Yahya"

¹¹⁶ Harun Yahya, *How the Quran Guides Science*, New Delhi, Adam Publishers, 2004, p.ii.

It constitutes the underpinnings of a dishonest philosophy, namely materialism, which essentially denies the existence of a divine creator and transforms humanity into a creature that only heeds matter. There are three main reasons to invalidate Darwinism. First of all, evolutionary theory cannot explain the origins of life on the earth. Secondly, theoretical evolutionary mechanisms, such as natural selection, favourable variation and mutation have no real evolutionary power. Thirdly, the fossil record proves that living beings did not evolve but emerged completely and perfectly on the earth.

In The Evolution Deceit, The Scientific Collapse of Darwinism and Its Ideological Background, Harun Yahya describes the scientist who believes in evolution as having “a blind superstitious faith, ... who has a devotion to a preposterous scenario constructed by the imagination...This scientist has a faith in a materialistic philosophy which argues that matter has existed for all eternity and there is nothing other than matter. The theory of evolution is the so-called scientific foundation for this materialistic philosophy, and it is blindly defended in order to uphold the philosophy.”¹¹⁷The book carries out a detailed refutation of Darwinism. Harun Yahya has authored a series of children books that introduce topics in science through the eyes of faith to young readers. Books for children include:

1. *Children, Darwin Was Lying!*

¹¹⁷ Harun Yahya, *In The Evolution Deceit, The Scientific Collapse of Darwinism and Its Ideological Background*, Istanbul: Okur Publishing, 2000, p.4.

2. *The World of Animals*
3. *Honeybees Which Build Amazing Honeycombs*
4. *Our Little Friends: The World of Ants*

Adnan Oktar believes that the main reason for the state of the world, with its continuing conflicts and unending cruelty, is the ideological prevalence of disbelief. People are forced into a downward spiral of violence, corruption and conflict. This direction of descent can only be changed by the ideological defeat of disbelief and by ensuring that everyone knows about the wonders of creation and Qur'anic morality, so that the fabric of society can improve. The books published by Harun Yahya are an attempt to educate and enlighten people, to inspire them to work towards attaining the peace, bliss, justice and happiness promised in the Qur'an. His works on Qur'anic topics include:

His works on Qur'anic topics include: *Ever Thought About the Truth?*, *Devoted to Allah*, *Abandoning the Society of Ignorance*, *Paradise*, *The Moral Values of the Qur'an*, *Knowledge of the Qur'an*, *Qur'an Index*, *Emigrating for the Cause of Allah*, *The Character of The Hypocrite in the Qur'an*, *The Secrets of the Hypocrite*, *The Names of Allah*, *Communicating the Message and Disputing in the Qur'an*, *The Basic Concepts in the Qur'an*, *Answers from the Qur'an*, *Death Resurrection Hell*, *The Struggle of the Messengers*, *The Avowed Enemy of Man: Satan*, *Idolatry*, *The Religion of the Ignorant*, *The Arrogance of Satan*, *Prayer in the Qur'an*, *The Importance of*

*Conscience in the Qur'an, The Day of Resurrection, Never Forget, Disregarded Judgements of the Qur'an, Human Characters in the Society of Ignorance, The Importance of Patience in the Qur'an, General Information from the Qur'an, Quick Grasp of Faith 1-2-3, The Crude Reasoning of Disbelief, The Mature Faith, Before You Regret, Our Messengers Say, The Mercy of Believers, The Fear of Allah, The Nightmare of Disbelief, Jesus Will Return, Beauties Presented by the Qur'an for Life, Bouquet of the Beauties of Allah 1-2-3-4, The Iniquity Called "Mockery", The Secret of the Test, The True Wisdom According to the Qur'an, The Struggle with the Religion of Irreligion, The School of Yusuf, The Alliance of the Good, Slanders Spread Against Muslims Throughout History, The Importance of Following the Good Word, Why Do You Deceive Yourself?, Islam: The Religion of Ease, Enthusiasm and Vigour in the Qur'an, Seeing Good in Everything, How do the Unwise Interpret the Qur'an?, Those Who Do Not Listen to the Qur'an, Some Secrets of the Qur'an, The Courage of Believers, Being Hopeful in the Qur'an, Justice and Tolerance in the Qur'an, Basic Tenets of Islam.*¹¹⁸

¹¹⁸Harun Yahya, *The Miracle in the Atom*, Istanbul Turkey, Secil Ofset, 2001, p.ii.

4.22 Dr. Zakir Naik (b.1965 C.E.)

A medical doctor by professional training, Born on October 18, 1965 in Mumbai, India,¹¹⁹ Dr. Zakir Abdul-Karim Naik, President of the Islamic Research Foundation (IRF) is renowned as a dynamic international orator on Islam and Comparative



Dr. Zakir Abdul-Karim Naik

Religion. Dr. Zakir Naik clarifies Islamic viewpoints and clears misconceptions about Islam, using the Qur'an (reciting each and giving each Surat, Ayat number by heart), authentic Hadith and other religious Scriptures as a basis, in conjunction with reason, logic and scientific facts.¹²⁰ Though a medical doctor by professional training he has turned around to spread the truth of Islam to millions worldwide. He has learned hundred and thousands of pages from different books by heart and has the knowledge of scientific and mathematical facts and theories. He is also the founder and chairman

¹¹⁹ <http://www.famousmuslims.com>, s.v. "Dr Zakir Naik"

¹²⁰ <http://www.irf.net>.

of Islamic Research Foundation. The Islamic Research Foundation (IRF), Mumbai, India, is a registered non-profit public charitable trust. It was established in February 1991. It promotes Islamic Da'wah¹²¹ - the proper presentation, understanding and appreciation of Islam, as well as removing misconceptions about Islam - amongst less aware Muslims and non-Muslims.

Dr. Zakir Naik¹²² appears regularly on many international T.V. Channels in more than 100 countries of the world. He is regularly invited for T.V. and Radio interviews. More than a hundred of his talks, dialogues, debates and symposia are available on video cassettes, video CDs and audio cassettes. He has authored books on Islam and Comparative Religion. He received an award for Service to Islam and humanity given by the International Islamic Internet University in Los Angeles.¹²³

Dr. Zakir is popular for his critical analysis and convincing answers to challenging questions posed by audiences after his public

¹²¹ IRF uses modern technology for its activities, wherever feasible. Its presentation of Islam reach millions of people worldwide through international satellite T.V. channels, cable T.V. networks, internet and the print media. IRF's activities and facilities provide the much needed understanding about the truth and excellence of Islamic teachings - based on the glorious Qur'an and authentic Hadith, as well as adhering to reasons, logic and scientific facts.

¹²² Sheikh Ahmed Deedat, the world famous orator on Islam and Comparative Religion, who had called Dr. Zakir, "Deedat plus" in 1994, presented a plaque in May 2000 awarded to Dr. Zakir Abdul-Karim Naik for his achievement in the field of Dawah and the study of Comparative Religion with the engraving "Son what you have done in 4 years had taken me 40 years.

¹²³ <http://www.famousmuslims.com>

talks. In the last 6 years (by the year 2002), Zakir Naik has delivered more than 600 public talks in the U.S.A., Canada, U.K., Saudi Arabia, U.A.E., Kuwait, Qatar, Bahrain, South Africa, Mauritius, Australia, Malaysia, Singapore, Hong Kong, Thailand, Guyana (South America) and many other countries, in addition to numerous public talks in India. He has successfully participated in several symposia and dialogues with prominent personalities of other faiths. His public dialogue with Dr. William Campbell (of USA), on the topic, “*The Qur’an and the Bible in the light of Science*” held in city of Chicago, U.S.A., on April 1, 2000 was a resounding success.¹²⁴

He has authored various articles and books on Islam and Comparative Religion. He has discussed and explained Islam on hundreds and thousands of scientific facts. He in his book “*QUR’AN AND MODERN SCIENCE - Compatible or Incompatible*” states:

A modern rational man, however, would never accept a religious scripture which says, in the best possible poetic language, that the world is flat. This is because we live in an age, where human reason, logic and science are given primacy. Not many would accept the Qur’an’s extraordinarily beautiful language, as proof of its Divine origin. Any scripture claiming to be a divine revelation must also be acceptable on the strength of its own reason and logic. According to the famous physicist and Nobel Prize winner, Albert Einstein, “Science without religion is lame. Religion without science is blind.” Let us therefore study the Qur’an, and analyze whether the Qur’an

¹²⁴<http://www.irf.net>.

and Modern Science are compatible or incompatible? The Qur'an is not a book of Science but a book of 'Signs', i.e. Aayaats. There are more than six thousand 'Signs' in the Qur'an of which more than a thousand deal with hard core Science. In this book I have considered only established scientific facts and not hypotheses and theories based on mere assumptions and not backed by proof.¹²⁵

Zakir continues to amaze people, with his Genius Personality, and continues to travel around the world giving lectures, conducting Da'wah training programs including international training Programs for training Muslims to effectively convey the message of Islam with Quran, Hadith, logic, reason and scientific facts. Some of his famous books are:

1. *Replies to the most common questions asked by non-muslims*
2. *Qur'ân and Modern Science - compatible or incompatible*
3. *Concept of god in major religions*
4. *Islam and Terrorism*
5. *Women's Rights in Islam - Protected or Subjugated?*
6. *Al-Qur'ân - Should It Be Read With Understanding?*
7. *Is the Qur'ân God's Word?*

¹²⁵ Dr. Zakir Abdul Karim Naik, *The Qur'an and Modern Science Compatible or Incompatible?*, Mumbai, Islamic Research Foundation (IRF), p.5.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, the Compassionate, the Merciful

CHAPTER 4

SCIENTIFIC PURSUIT IN THE MUSLIM SCIENCE CENTERS

In twentieth century it was a moment of contemplation and pondering over the life conditions of Muslims all over the world. Muslims in general and Muslim countries in particular were facing numerous questions from science front of the world. Questions came up one after the other in a rapid succession: Can Muslims make some prominent and quite distinguished contribution? Where is Islam's role in sciences and technology? Where do Muslims stand in respect of world civilization and what was their place in past civilizations? What is Islam's view concerning modern scientific innovations? To fill up this gulf Muslims started to make science centers, organizations and foundations. Following are some significant Muslim science centers:-

5.1 The Islamic World Academy of Science (IAS)



Introduction

Scientific Institutions have always had a major role in promoting science and technology and thus influencing the general state of development of all societies. In response to the need for an International organization that could undertake such a task, *the*

Islamic World Academy of Sciences (IAS) came into being as an independent, non-political, non-governmental and non-profit making organization of distinguished scientists and technologists dedicated to the promotion of all aspects of science and technology in the Islamic World, for the benefit of mankind. The establishment of the Islamic World Academy of Sciences (*IAS*) was proposed by the OIC¹ Standing Committee on Scientific and Technological Co-

¹The Organization of the Islamic Conference (OIC) is the second largest inter-governmental organization after the United Nations which has membership of 57 states spread over four continents. The Organization is the collective voice of the Muslim world and ensuring to safeguard and project the interests of the Muslim world in the spirit of promoting international peace and harmony among various people of the world. The Organization was established upon a decision of the historical summit which took place in Rabat, Kingdom of Morocco on 12th Rajab 1398 Hijra (25 September 1969) as a result of criminal arson of Al-Aqsa Masjid in occupied Jerusalem.

operation (COMSTECH)², and approved by the Fourth Islamic Summit held in Casablanca in 1984³. The IAS was founded formally in 1986 with the patronage and support of Jordan and Pakistan and under the inspired and farsighted leadership of the late Dr. M.A.



Dr Ali Kettani

Secretary
The
Fellow of
only 38,
a vision

Kazi (FIAS Pakistan), IAS' Founding President and the late Dr. Ali Kettani (FIAS Morocco), IAS Founding



Dr M.A. Kazi

General.
Founding
the IAS
numbered
who shared
of



**COMSTECH Secretariat
in Islamabad**

independent non-political organization that is mandated to help the *Ummah* realize socio-economic advancement through science and technology. ⁴

² The Third Islamic Summit Conference, held at Makkah al-Mukarrama, Kingdom of Saudi Arabia in January 1981, decided to establish a standing committee for scientific and technological cooperation (COMSTECH). The Committee was mandated to undertake follow-up-action and implementation of the resolutions of Islamic Conference, to study all possible means of strengthening cooperation among Members States and to draw up programs and submit proposals designed to increase the capability of the Muslim countries in the fields of science and technology.

³ http://www.oic-oci.org/oicnew/page_detail.asp?p_id=66

⁴ *IAS News Letter*, Amman Jordan, Islamic World Academy of Science, 2007, vol.21, no. 35, p.1.

Operating from its Amman Secretariat, the Academy hopes to continue the work it had started in 1986, namely assisting the decision-makers and scientists and technologists of the *Ummah* and helping them achieve an advanced level of development for their countries.⁵ The Academy is a sovereign body governed by a General Assembly in which all Founding and elected Fellows are member. The number of Academy Fellows was 88 in January 2001 they represent more than 30 countries and numerous scientific disciplines. The Fellows of the Academy are eminent figures, each of whom in his field have achieved a great deal and have contributed significantly to his country's development and to that of the Developing World in general.⁶

The Academy's primary sources of income are the annual grants it receives from the government of Jordan, allocated general and administrative expenses, and that of *COMSTECH*, which is wholly allotted to activities and programmes. The programmes of the Academy are further financed through grants from Islamic organizations such as the Islamic Development Bank (IDB). The Academy also undertakes joint programmes with many *UN* and other international agencies such as the United Nations Educational,

⁵<http://www.ias-worldwide.org/about.html>

⁶ <http://www.ias-worldwide.org/structure.html>

Scientific and Cultural Organization (UNESCO)⁷ and the United Nations Environment Programme (UNEP), as well as the World Bank. Moreover, the Academy sometimes receives donations from local and international companies as well as charities in the Islamic World.⁸

AIMS AND OBJECTIVES OF IAS

1. IAS aims to increase interaction among scientists and facilitate the exchange of views on development issues, and to function as the Islamic Brain Trust helping the Islamic and Developing Worlds in scientific and technology fields.⁹

2. IAS's mission is to provide an institutional set up for the utilisation of Science and Technology for the development of Islamic countries and humanity at large.¹⁰

3. To serve as a consultative organisation of the Muslim Ummah and institutions of member states of the Organisation of the Islamic Conference (OIC), on matters related to science and technology;

4. To initiate scientific and technological programmes and activities in science and technology, and to encourage co-operation among research groups in the various Islamic countries on projects.

⁷ UNESCO was founded on 16 November 1945. It is working to create the conditions for genuine dialogue based upon respect for shared values and the dignity of each civilization and culture.

⁸ <http://www.ias-worldwide.org/finance.html>

⁹ <http://www.ias-worldwide.org/mission.html>

¹⁰ <http://www.ias-worldwide.org/vision.html>

5. To encourage and promote research on major problems of importance facing the Islamic countries and to identify future technologies of relevance for possible adoption and utilization; and
6. To formulate standards of scientific performance and attainment and to award prizes and honours for outstanding scientific achievements to centres of excellence in all science and technology disciplines.¹¹

Achievements

The number of publications originating from the Islamic World is very small. Publications, whether in the form of scientific articles, books or monographs are generally in very short supply. The Academy realizing the need for such publications, has committed itself to publish a series of books/monographs that address contemporary scientific issues, in a fresh and concise manner. The first of these publications is a book by the late M. A. Kazi entitled *Islamic Thought and Modern Science (1998)* The second of these publications is also a book by the late M. A. Kazi entitled *Qur'anic Concepts and Scientific Theories (1999)* .The latest book published by the LAS is the English / Arabic version of *Personalities Noble*¹²

¹¹ LAS News Letter, *op.cit.*, p.7.

¹² In 1983, the National Science Council of Pakistan and Hamdard Foundation published what was to become a very famous book. The name chosen by the then editor HAKIM Mohammed Said for the book was "personalities Noble ". The book contained a brief description of the life and scientific contributions of 26 towering figures of the golden age of Islamic. Demand on the book was such that within a few years only a few rare copies were still in existence. Realizing the importance of the book, and appreciating its value a reference, especially to the younger generation in the Islamic world, LAS decided to publish a second revised edition

(2000).¹³ Upon the request of the Organisation of the Islamic Conference (OIC) Standing Committee on Scientific and Technological Co-operation (COMSTECH), and under its sponsorship, the Academy publishes the Arabic version of COMSTECH's *Islamic Thought and Scientific Creativity*, the high quality quarterly publication. A total of twenty issues of the Arabic version were published and distributed. This was done, as a joint activity of the Academy and the Amman-based Royal Academy for Islamic Civilisation Research, *Al Albait Foundation*.¹⁴

The Academy also publishes a *Brochure* or *Guide*. The guide contains highlights of the overall programme, a summary of the activities, updated list of Academy Fellows as well as a brief account of the Academy's long term plans, and future activities. The Academy, through its Secretariat, regularly publishes the *Newsletter* of the Islamic World Academy of Sciences. This widely distributed publication aims to publicize the various activities the Academy undertakes, and also to put across the Academy's programmes. It also often contains news about the Academy, its Fellows and staff. The

of "Personalities Noble ", in both English and Arabic. *IAS* Secretariat staff together with the help of Jordan's most senior translators worked on re-editing and revising the Arabic and English manuscript. Some touching-up on the portraits has to be done by an expert for added quality as well. The book has now appeared in a ISO-Pages volume, with the Arabic text on one side and English on the other. *IAS* hopes to market the book to schools, universities as well as individuals throughout the Islamic world in to generate the interest of the readers in the great Islamic heritage in science and contribute in a very small way the long sought after revival and rejuvenation, of science and technology in Islamic and developing countries.

¹³ <http://www.ias-worldwide.org/book.html>

¹⁴ <http://www.ias-worldwide.org/other.html>

Newsletter, as well as regularly profiling some Academy Fellows, frequently contains specialized and guest articles on contemporary scientific and technical topics including such matters as the S&T potential of *OIC*-member countries and institutions.

The “*Journal of the Islamic World Academy of Sciences*”, which first appeared in August 1988, is a quality publication comparable to international scientific journals. Through the dedication of a small group of Academy Fellows headed by Prof. Naci M Bor, the Editor in Chief of the Journal, the *Journal* has made since then, a good record of quality and periodicity and has been granted an *ISS* number (ISSN 1016-3360). For the first ten years of its existence, the *Journal* was a broad-based scientific publication on average carrying general scientific articles. The *Journal* has in 1998 been re-launched as a specialized medical *Journal* thus becoming the Medical Journal of the Islamic World Academy of Sciences.¹⁵

The Academy Conferences represent open forum at which experts meet and discuss a particular topic, with the aim of arriving at a common understanding of that topic and formulating core policies that can help developing countries overcome their development difficulties. The conferences are also intended to be educational for participants, and focal points through which specialized organizations can forge long-term co-operation links.

¹⁵<http://www.ias-worldwide.org/science.html>

The Academy has organized almost fifteen conferences so far on different scientific topics.¹⁶

5.2 Islamic Organization for the Medical Sciences (IOMS)



IOMS Headquarter

Introduction

IOMS stands for *Islamic Organization for the Medical Sciences*. Its president is Dr. Abdul Rahman



Al-Awadi

¹⁶<http://www.ias-worldwide.org/seminars.html>

Al-Awadi. It has its Head Quarter at Kuwait. It is a non-governmental, non-profitable, charitable organization having no political overtures of any kind, keenly interested in promoting the health standards of the humankind through collaborative activities in Islamic countries as well as Muslim communities throughout the world, focusing on Medical Ethics, Heritage, Healthy Lifestyles and Herbal/Traditional Medicine. It was established in the year 1984 and since then myriad of activities have been conducted. ¹⁷The IOMS has emerged to adopt Islamic medicine which is characterized by viewing man in his capacity as Allah's deputy on earth and considering him as one indivisible whole: body, soul, and spirit. It is a type of medicine that derives its teachings and practices from Islamic Sharia and abides by its provisions of what is permissible and what is prohibited and the grey area between the two. It touches upon everything related to man's health in a clear and logical language, whether about diet or drug which is almost free from side effects. The idea was nurtured in Kuwait and embraced by its good people. Thus Kuwait was the base and point of departure for this great project. Right from the start, the aspirations for the organization transcended limited local effort or regional confinement. His Highness the Amir of Kuwait extended his kind patronage to this organization and encouraged its establishment. Hence, the Amiri Decree No.18 for 1984 that set

¹⁷ www.islamset.com

the idea of the ground and the Islamic Organization for Medical Sciences emerged into full existence to launch unswerving efforts in nurturing the tree of medical sciences that had ceased to bear any fruit through long negligence. The tree of the Islamic Organization for Medical Sciences that took root in Kuwait is beginning to bear fruit with its achievements and propagation of the idea in the Arab, Islamic and even non-Islamic countries. The idea has been well received in the East as well as in the West, and Islamic conferences are being held here and there raising the Islamic voice to be heard in international and universal quarters, and organizing man's relationships with his God and his environment, and holding high the banner of Arabism and Islam: "The scum is cast away, but that which is of use to man remains behind. Thus Allah coins His parables".¹⁸

AIMS AND OBJECTIVES OF IOMS

The IOMS aims to achieve the following:

1. To survive the doctrines of the Islamic Religion relating to the treatment of and protection against various physical and psychological ailments. The Organization also aims to revive Islamic heritage in the domain through a re-reading of researches and studies carried out by the pioneer Muslim physicians in the light of

¹⁸ www.islamset.com/ioms/synopsis.html

modern technological advances in an attempt to find scientifically based applications of these studies for the service of mankind.

2. To encourage research workers in the field of Islamic medical sciences and concert medical and juristic viewpoints with a view to reach a common ground on controversial medical and legal issues in the application of recent medical findings and providing alternative drugs and methods of treatment to those prohibited in Islam.

3. To co-operate with national and international organizations and societies adopting the same-purpose of IOMS and help them propagate their vocation in the best possible way, and to encourage the formation of new centers and societies with similar aims, doing whatever is necessary to get them join the IOMS.

4. To establish health centers for the needy Muslims in the world.

5. For enlightening the young Muslim generation, to seek and link the educational programmes, particularly in the field of Medicine, to the Islamic heritage and values upon which Islamic civilization, teachings and tolerant Juridprudence (*Sharia*) have been based.

6. To unify, publish and propagate scientific terms and Islamic moral concepts for the medical professions.

7. To co-ordinate efforts exerted in the field of health services in the Islamic World.¹⁹

Achievements

During its relatively short duration, the Islamic Organization for Medical Sciences has managed to achieve a number of the main objectives mentioned in its Constitution. Through persistent efforts, it is working hard towards achieving all those objectives for the attainment of the desired aim and the noble purpose to which it aspires.

The realization of the IOMS objectives has been effected at international, Islamic and local levels through conferences, symposia and cooperation with international, regional and local bodies and organizations. The International Conferences on Islamic Medicine held outside Kuwait, which is the permanent base of the IOMS, aims to propagate the idea of reviving the Islamic medical tradition in the countries hosting these conferences.

Another aim is to bring together men of medical sciences, Islamic jurisprudence and the humanities to discuss subjects related to medical jurisprudence and medical innovations through the presented papers and studies. These conferences also discuss applied

¹⁹ <http://www.islamset.com/ioms/aims.html>

aspects of Islamic medicine, whether preventive or therapeutic. Almost six international conferences have been held by IOMS.

In first international conference the recommendations called for linking the Islamic nation to its tradition especially in the medical and scientific fields; encouraging the study of the Islamic medical and scientific fields; encouraging the study of the Islamic medical heritage and work on scientific, empirical, clinical and laboratorial research; appealing to the specialists to cast lights of truth on the history of Islamic Civilization; the necessity that medical education courses should include the study of Islam and of the history of Islamic medicine; the adoption of Kuwait's Project for a Code of Islamic Medical Ethics; and the formation of an Islamic Council for studying scientific innovations.²⁰

The second conference stressed the importance of mapping out the health conditions in the Islamic World and defining its health problems and indicating ways of mutual cooperation among Muslims. It also recommended the study of medicinal plants and the setting up of an Islamic company for the preparation and production of herbal drugs. The conference laid emphasis on verifying and editing traditional works on medicine, preparing a comprehensive index of the manuscripts on Islamic medicine, and establishing a library for books, researches and academic thesis related to Islamic medicine.

²⁰ <http://www.islamset.com/ioms/firstcon.html>

It was also recommended that the policy for education throughout all its stages should be of an Islamic nature and should have an Islamic purpose. The conference alluded to the importance of preparing the faithful Muslim physician, attesting medical jurisprudence and clarifying jurisprudential provisions with a view to keeping medical practice within the Islamic legal bounds. Finally, the conference recommended that Kuwait's Project for a Code of Islamic Medical Ethics should be widely published and taught at medical schools and that the oath proposed in this Project should be approved and adopted.²¹

The Third Conference on Islamic Medicine assumed a special importance after the Islamic Organization for Medical Sciences (IOMS) had taken its final legal shape and started full-swing work in accordance with its defined aims and constitution. The importance of this Third Conference was also due to the fact that it was held, for the first time, outside Kuwait which had initiated these Islamic scientific meetings. Meanwhile, interest in the subject of Islamic medicine had been growing in several places, which meant that what had been sown in the soil of Kuwait was beginning to bear fruit. The Third International Conference on Islamic Medicine recommended the compilation of a traditional medical dictionary containing full information about the most outstanding Muslim men of medicine; showing ways of benefiting from medicinal plants and herbs

²¹ <http://www.islamset.com/ioms/2ndcon.html>

through seminars; and working out programmes to find facts about youth problems and difficulties with a view to solving them for safeguarding the future of the Islamic nation. The conference stressed the importance of bolstering the efforts made by the IOMS especially in the fields of writing and translation within its spheres of interest, and of offering study courses in the specialism mostly required by the Islamic world.

The Third Conference did not neglect, in its concluding recommendations, setting on record deep appreciation for the efforts made by Kuwait: Amir, government and people, towards adopting the IOMS, issuing its laws and regulations as well as the special decree of its constitution, and supporting its activities.²²

The Islamic Organization for Medical Sciences (IOMS), in collaboration with the Islamic Education, Science and Culture Organization (ISESCO) and the World Health Organization, held its Sixth International Convention for Islamic Medicine under the title: “Drugs, Psychologically harmful Substances and Smoking: A threat to Future Generations, during 1998, in Istanbul, Turkey.” The participants have approved the following General Principles:

1. Physical and mental health is a blessing from God Almighty. Any threat or harm caused to it is liable to exact a high price.

²² <http://www.islamset.com/ioms/3rdcon.html>

Accordingly, the protection of humanity against any harmful or disabling substances is a paramount Islamic duty.

2. Addiction to intoxicants, drugs, tobacco and other psychologically harmful substances, in all its forms, has today become a world-wide problem, with not a single country being immune from it. Muslim countries have a duty be at the front of the international effort to prevent this epidemic and protect present and future generations against it.
3. The many dangers that threaten humanity as a result of this problem are far greater than many people, including its victims, can imagine. This fact calls for effective education, based on proper scientific methods and approach.
4. Muslim countries, in particular, should be at the forefront in fighting this epidemic, guided by the Quranic principle: “Do not kill yourselves,”²³ and: “Do not with your own hands bring destruction upon yourselves,”²⁴ and the general rule propounded by the Prophet Muhammad (S.A.W.S) that: “Harm should neither be inflicted nor sustained.”²⁵ Furthermore, the human mind is the seat of responsibility and accountability, protected by the *shariah*; any violation, invasion or disabling of the mind, in any way whatsoever, is in violation of the *shariah* and contrary to its spirit and aims.

²³ *Al-Qur'an*, 25:68 also 6:151.

²⁴ *Ibid.*, 30:41

²⁵ Al Hajjaj bin Muslim, *Sahih Muslim*, Riyadh, Saudi Arabia, Daru ibn al Jawzi, 2002, Hadith no.2588, p.1349.

5. Fear of God and the incentive of faith and religious deterrence form, altogether, the first line of defense in this regard, and it should be fortified and strengthened further by all available means.
6. To achieve this goal, all countries must rectify the United Nations conventions on the banning of illegal trade in drugs, and psychologically harmful substances.
7. A factor of success has also been the support given to resolutions passed at the Extraordinary Session of the UN General Assembly, held during 8-10 June 1998, on prevention of illegal drugs, including reinforcement of drugs control and their progenitors, prevention of money laundering and the reduction of demand for drugs, the elimination of farming of illegal substances and support of alternative development programmes, and the combat of amphetamines. Depending on the particular regional situation, support for the Arab world strategy for the combat of drugs and psychologically harmful substances, would increase the chances of success in prevention and treatment for the Arab population.
8. Prevention will have a better chance of success if it starts with the young and before it is too late. This requires the incorporation of educational material in the school curricula from primary levels onwards, and the training of parents, teachers and instructors. Special procedures must be put in place

- with such flexibility as to allow the use of religious values, useful customs and traditions in the prevention or treatment processes.
9. Care for future generations dictates that the provision in the mother's womb of a clean and healthy environment. This means more educational and health care for pregnant mothers.
 10. The proven success of religious education and instruction in the prevention of drug addiction and the treatment of addicts is in need of greater support and encouragement. More field studies and scientific documentation is required in this area.²⁶

The fourth International Conference on Islamic Medicine was held in Karachi from November 9 to 13, 1986 under the patronage of President Mohammad Zia-Ul Haq of the Islamic Republic of Pakistan and at the invitation of Hakim Mohammad Said, Chairman of Hamdard Foundation. The conference was presided over by the Prime Minister of Pakistan Mohammad Khan Junejo. In its recommendations, the conference stressed the importance of child care in the light of Islamic teachings and called for the issuance of an Islamic Declaration of Child Rights as they are provided for in the Islamic teachings. There was also a recommendation to protect the youth from the wide-spread harms caused by such prohibited materials as liquors and drugs, and to consolidate Islamic ties within the family as well as within the whole society.

²⁶ http://www.islamset.com/healnews/smoking/narcotics/final_statement.html

A special attention was given to the spiritual dimension in medical applications and to the necessity of injecting the programmes of medical education with whatever helps to prepare the Muslim doctor to serve Islam and work for the good of humanity. The conference asserted the pioneering efforts made by the IOMS, both locally and internationally, to rid man of the hazards of alcohol and to dispense with it in the manufacture of drugs. The IOMS was also commended on issuing its project for registering and monitoring the quality of pharmaceutical preparations.²⁷

Further the law concerning the safety and good quality of herbal drugs is one of the important achievements of IOMS.

If the trend in the world today is to use drugs prepared and manufactured from medicinal plants and herbs to avoid the side effects of chemical-drug preparations, the accomplishments of Muslims in this field assert their pioneering role.

In collaboration with the WHO (World Health Organization) Regional Office of Eastern Mediterranean, the IOMS has determined the requirements for registering, monitoring and marketing herbal drugs. These requirements guarantee unified conditions and specifications for preparing and manufacturing these drugs. These procedures are meant to make sure that good quality

²⁷ <http://www.islamset.com/ioms/4thcon.html>

drugs will be available. They are also meant to encourage and develop the herbal drug industry.

Therefore, the herbal drug law has been laid down for guaranteeing the safety and quality of these drugs and submitting their marketing to official control by the concerned authority.

The term “herbal drug” mentioned in the text of the law is defined as “Any preparation whose effective component is derived from a herbal origin and is finally packed by the manufacturer and then marketed to be used for curing and/or preventive purposes.”

The law prohibits all forms of dealing in these herbal drugs before they are registered at the concerned authorities. The prohibition covers the whole process of marketing, starting with manufacturing or importing the drug and ending with selling by retail to the consumer, provided that the drug is packed and labelled as an herbal drug.

The law stipulates the required conditions for registering the herbal drug and determines the specifications for its manufacturing explaining the process followed for controlling the elements and preparations as well as the herbal derivation that go into making it. The law also contains regulations for controlling the quality and specifications of the raw materials used the reinforcing herbal ingredients, the effective pharmaceutical properties, etc. in a bid to

guarantee the safety and quality of the herbal drugs available for public consumption.²⁸

“The Islamic Guide to Medical Jurisprudence” is one of the publications issued by the IOMS in the framework of its dealing with the Islamic legal aspects of medical practice. The book offers to the reader simplified explanations of what a Muslim patient should do concerning the worships he has to perform. The body has been classified according to its organs and the diseases that may attack each of them with notes about the symptoms of these diseases and about ways of curing them through oral, anal or injectional means. This is followed by giving the Islamic legal opinion about each case in a clear and simple language. Legal terms which might prove difficult to understand by the layman are deliberately avoided. The first part of the Guide deals with the digestive system in the human body and diseases it is liable to suffer from.

The IOMS was keen to make it clear that the Guide is not an alternative for contacting learned men of religion and asking for their advice. It only helps those who cannot do so for one reason or another.

These provisions should be known to both the Muslim patient and to the Muslim doctor so that they may rest assured about the right performance of the enjoined rituals of Islam. The purpose of

²⁸ <http://www.islamset.com/ioms/herbal.html>

issuing this Guide in general is to point out the Islamic legal provisions concerning certain exemptions and permissible exceptions in the performance of worships in the case of illness.²⁹

5.3 International Institute of Islamic Thought (IIIT)



IIIT Logo

Introduction

IIIT stands for the *International Institute of Islamic Thought*. Its founder president was the Martyr Ismail Raji al Faruqi. It is a private, non-profit, academic and cultural institution, concerned with general issues of Islamic thought. The Institute was established in the United States of America in 1981 (1401 AH). It is independent of local politics, party orientations and ideological biases. The Institute is governed by a Board of Trustees that meets regularly and periodically elects one of its members to serve as President. The headquarters of

²⁹ <http://www.islamset.com/ioms/guide.html>

the Institute are situated in Herndon, Virginia, in the suburbs of Washington DC. Branches and offices have also been established in a number of capitals world-wide in order to carry out the Institute's activities and programs.³⁰The Institute has also signed many agreements of cooperation with many universities, research centers and academic institutions to carry out activities of mutual interests.

The IIT is an intellectual forum working from an Islamic perspective to promote and support research projects, organize intellectual and cultural meetings and publish scholarly works. It has established a distinct intellectual trend in Islamic thought which relates to the vivid legacy of the *Ummah* (Universal Muslim Community), and its continuous efforts of intellectual and methodological reform. This involves a large number of researchers and scholars from various parts of the world.³¹

The International Institute of Islamic Thought is dedicated to the revival and reform of Islamic thought and its methodology in order to enable the *Ummah* to deal effectively with present challenges, and contribute to the progress of human civilization in ways that will give it a meaning and a direction derived from divine guidance. The realization of such a position will help the *Ummah* regain its intellectual and cultural identity and re-affirm its presence as a dynamic civilization.

³⁰*www.iit.org*.

³¹*Idem*

Aims and Objectives of IIIT

The institute has following aims and objectives:

1. To serve as a think tank in the field of Islamic culture and knowledge
2. Formulate a comprehensive Islamic vision and methodology that will help Muslim scholars in their critical analysis of contemporary knowledge.
3. Develop an appropriate methodology for understanding the Qur'ān and the Sunnah of the Prophet Muhammad (SallAllahu 'alaihi wa Sallam) and firmly establish them as sources of guidance, knowledge and civilization.
4. Develop an appropriate methodology for dealing with Islamic legacy and contemporary knowledge, in order to draw on the experiences of both past and present, to build a better future for the *Ummah* and humanity at large.
5. Develop an appropriate methodology for understanding and dealing with the present situation of both the *Ummah* and the world in general, in view of contemporary challenges and opportunities.

Achievements

The “*Muslim World Book Review*”, a quarterly journal published by the Islamic Foundation, Leicester, U.K., in association with the

International Institute of Islamic Thought (IIIT), provides a unique source of information for all who are concerned with development in the Muslim world. It critically analyses views expressed both in the West and the East on a variety of issues related to the Muslim world. Each issue of this journal is rich in information, criticism and suggestions which go a long way to promoting a better understanding of the Muslim world and cementing healthy relations between the East and the West.

The Institute promotes academic research on the methodology and philosophy of various disciplines, and gives special emphasis to the development of Islamic scholarship in contemporary social sciences. The program, which has become known as “Islamization of Knowledge”, endeavors to elucidate Islamic concepts that integrate Islamic revealed knowledge with human knowledge and revives Islamic ethical and moral knowledge.³² According to this position, the fundamental premise for establishing an Islamic science is based on the worldview which recognizes that the word of God is revelent in each and every sphere of human activity that God has created this universe with a purpose and He has made man His viceregent for an appointed term. The model and example to be followed is that of the Prophet Muhammad (SallAllahu ‘alaihi wa

³²*Idem*

Sallam) .Nature is not to be exploited but should be understood and treated as a trust given to man by the creator. The Institute has also drawn attention to the current “crisis of the Muslim mind,” and emphasized the need to build an Islamic system of knowledge. It further called for the development of specific and competitive methodologies to deal effectively and efficiently with the *Qur’an*, the Sunnah, the Islamic heritage and contemporary issues. Indeed, it feels that the Islamic civilization and its intellectual presence could not only provide solutions for the problems of the Muslims, but could also contribute effectively to solve some of the problems of modern civilization in general and provide a moral guidance for mankind.³³

IIIT made its programs possible through the conducting of Conferences and Seminars at international, regional and local levels, during which thousands of scholars from various disciplines have had a chance to meet to discuss and debate issues. Since the seminar on “Islamic thought” in Lugano, Switzerland, in July 1977, in which the decision was made to establish the International Institute of Islamic Thought, the Institute has conducted more than 150 conferences, seminars and training courses. The proceedings of most of these seminars and conferences were published. It has also

³³*Idem*

supported and participated in several meetings conducted by other institutions and professional associations.³⁴

5.4 Association of Muslim Scientists and Engineers (AMSE)



Introduction

Association of Muslim Scientists and Engineers³⁵ Popularly known as AMSE, the Association of Muslim Scientists and Engineers is a group of professionals, para-professionals and near-professionals in science and engineering and related fields, who are also Muslims by faith. AMSE was founded in the late sixties and was later a constituent organization of the Islamic Society of North America (ISNA) at its founding in the early eighties. AMSE holds its annual conference co-located with the annual convention of

³⁴*Idem*

ISNA.³⁵Dr. Khurshid Qureshi is present president of AMSE. He has worked for 20 years with Multi nationals such as General Motors, Ingersoll Rand and Hughes Corporation. He has been highly recognized by his business and peers and awarded with entrepreneur of the year and emerging venture awards. In 1980s he advised the Government of Pakistan on improving Science & Technology education and to develop a strong industrial base.³⁶

Aims and Objectives of AMSE

The aims and objectives for which the Association of Muslim Scientists and Engineers (AMSE) is organized are:

1. To channel the talents of Muslim scientists and engineers in providing Muslim individuals and communities assistance and guidance in all spheres of human activity.
2. To provide encouragement, guidance and assistance to Muslim scientists and engineers in their education and careers.
3. To improve the distribution and dissemination of technical information and Islamic knowledge through journals, publications, meetings and similar medias.

³⁵<http://amseweb.org/default.aspx>

³⁶<http://amseweb.org/aboutus.aspx>

4. In general, to carry out any and all activities those are strictly scientific, educational, religious, cultural and charitable in accordance with Islamic teachings.³⁷



ISESCO New Headquarters

5.5 Islamic Educational, Scientific and Cultural Organization (ISESCO)

Introduction

ISESCO, Islamic Educational, Scientific and Cultural Organization is a specialized³⁸ international organization working within the framework of the Organization of the Islamic Conference, specializing in the fields of education, science, culture and communication. It has its headquarter at Rabat, capital city of

³⁷<http://amseweb.org/aboutus.aspx>

³⁸ http://www.oic-oci.org/oicnew/page_detail.asp?p_id=65

the kingdom of Morocco.³⁹ The Governments of the Member States:-

1. Believing that Islam, a religion of peace and tolerance, represents a way of life and a spiritual, human, moral, cultural and civilizational force which made, and is still making, constructive contribution towards the shaping of the Islamic World and the development of human civilization.
2. Responding to the expectations of the Member States and the hopes of the Islamic Ummah in achieving cooperation, solidarity, progress and prosperity within the framework of joint Islamic action.
3. In anticipation of the challenges faced by the Member States in the educational, scientific, cultural and communication fields, and being aware of the importance of such fields in achieving development, progress and prosperity, without neglecting the Ummah's glorious heritage.
4. Being aware of the close bonds which unite the peoples of the Islamic World through the unity of civilization and the shared spiritual, moral and cultural values, and seeking to encourage civilizational interaction and promote these shared civilizational, cultural and intellectual bonds.
5. Activating the principles of solidarity, mutual assistance and equality to reinforce cooperation among the Member States and

³⁹ <http://www.unesco.org.ma/index.asp>

thereby promote education, science, culture and communication through all appropriate means.⁴⁰

Aims and Objectives of ISESCO

The objectives of ISESCO include the following:

1. To strengthen, promote and consolidate cooperation among the Member States and consolidate it in the fields of education, science, culture and communication, as well as to develop and upgrade these fields, within the framework of the civilizational reference of the Islamic world and in the light of the human Islamic values and ideals.
2. To consolidate understanding among peoples inside and outside the Member States and contribute to the achievement of world peace and security through various means, particularly through education, science, culture and communication.⁴¹
3. To publicize the correct image of Islam and Islamic culture, promote dialogue among civilizations, cultures and religions, and work towards spreading the values of justice and peace along with the principles of freedom and human rights, in accordance with the Islamic civilizational perspective.

⁴⁰ *Idem*

⁴¹ http://www.oic-oci.org/oicnew/page_detail.asp?p_id=65

4. To encourage cultural interaction and to support the aspects of cultural diversity in the Member States, while preserving the cultural identity and protecting the independence of thought.
5. To consolidate complementarity and coordination among the specialized institutions of the Organization of the Islamic Conference in the fields of education, science, culture and communication and among the Member States of ISESCO, and promote cooperation and partnership with the similar governmental and non-governmental institutions sharing the same interest, inside and outside the Member States.
6. To take further interest in Islamic culture, highlight its specificities and publicize its landmarks in intellectual studies, scientific researches and educational curricula.
7. To work for establishing complementarity and correlation among the educational systems of the Member States.
8. To support the efforts of the educational, scientific and cultural institutions for Muslims in non-Member States of ISESCO.⁴²

To achieve the above mentioned objectives, ISESCO uses the following means:-

1. To devise plans and support the appropriate projects in order to develop Islamic culture and publicize it, and to disseminate

⁴² <http://www.iesco.org.ma/index.asp>

the teaching of Arabic to non-Arabic speakers all over the world, being the language of the Holy Qur'an.

2. To help universities, research centers and specialized bodies to establish chairs, institutes and departments, develop programmes of action and executive plans and encourage active cooperation between them, in order to serve the objectives of the Organization and respond to the needs of the Member States.
3. To develop the scientific and educational activities of individuals, organizations, associations concerned with the dissemination of the Islamic culture and its foundations and characteristics; support the efforts of Member States in developing programmes of education and technical and practical training; and encourage researchers and inventors from the Member States.
4. To encourage the research work, studies and training needed for the development and upgrading of education in the Member States.
5. To convene conferences, symposia, training sessions, seminars and workshops in cooperation with the Member States as well as national, regional and international bodies and organizations operating in the fields of education, science, culture and communication.

6. To set up mechanisms appropriate for publicizing the true image of Islam and Islamic culture and their contribution to the human civilization.
7. To hold educational, scientific and cultural competitions and forums in cooperation with the specialized institutions in the Member States.⁴³

Achievements

ISESCO made its aims and objectives possible by conducting Conferences and Seminars, during which thousands of scholars from various disciplines have had a chance to meet and discuss educational, scientific and cultural issues of the Islamic Ummah in particular and of the world in general. So for this date ISESCO has conducted nine General Conferences. The great achievements of this period enabled it to open up to and maintain a fruitful contact with the educational, scientific and cultural organizations the world over, such as UNESCO. The development of cooperation relations conferred on it a prominent status at the Arab, Islamic and international levels.

In its 8th General Conference(27-29 December 2003 A.D), OIC Secretary General Dr Abdelouahed Belakziz said, in this regard, that it would suffice to consider the joint projects between ISESCO and UNESCO for us to come to this realization. He also said that, given

⁴³ *Idem*

its experience and high expertise, ISESCO has certainly become a genuine mirror of the Islamic personality and identity of the Muslim world and, indeed, an indispensable reference for international institutions and for everyone interested in the Islamic civilization and culture. The OIC Secretary General also commended the tremendous efforts exerted by the Director General Dr Abdul Aziz Othman Altwajri of the Islamic Organization. These efforts are such that ISESCO has now become a towering cultural edifice that firmly established the Islamic Arab culture as a main component in world's culture, reviving its heritage and disentangling it from backwardness and stagnation.⁴⁴

On the level of the prospective strategic planning for an educational, scientific and cultural resurgence of the Islamic world, ISESCO laid down eight major strategies which constitute altogether the strategy of knowledge from an Islamic viewpoint. These strategies have been adopted in ISESCO's General Conference. The strategies are:

1. *Strategy for the Promotion of Education in Islamic Countries* – adopted by ISESCO's Third General Conference, Amman, 1988.
2. *Strategy for the Development of Science and Technology in Islamic Countries* – adopted by the 8th Islamic Summit Conference, Tehran, 1997.

⁴⁴*Final Report of ISESCO's 8th General Conference*, p.3-4.

3. *Strategy for Islamic Cultural Action in the West* – adopted by the 9th Islamic Summit Conference, Doha, 2000.
4. *Strategy for benefiting from Muslim competencies in the West* – adopted by the 29th Islamic Conference of Foreign Ministers held in Khartoum in 2002.
5. *Strategy for bringing Muslim Madhahibs closer together* – adopted by the 10th Islamic Summit Conference held in Putra Jaya, Malaysia, in 2003.
6. *Strategy for Development of Biotechnology in the Islamic World* – adopted by the 2nd Islamic Conference of Ministers of Higher Education and Scientific Research held in Tripoli in 2003.
7. *Strategy for management of water resources in the islamic world* – adopted by the 2nd Islamic Conference of Ministers of Higher Education and Scientific Research held in Tripoli in 2003.
8. *Strategy for the Promotion of University Education in the Islamic World* – adopted by the 3rd Islamic Conference of Ministers of Higher Education and Scientific Research, Kuwait, 2006 and the 4th General Conference of the Federation of the Universities of the Islamic World , Kuwait, 2007.⁴⁵

To fulfil its objectives, ISESCO has founded three subsidiary organs.

⁴⁵ <http://www.isesco.org.ma/English/strat/index.htm>

1. ICPSR:- ISESCO Center for Promotion of Scientific Research

ISESCO Center for Promotion of Scientific Research (ICPSR) is a specialized organ under the aegis of ISESCO's General Directorate. The following are the main objectives of the center

1. To promote advanced studies and scientific research in all fields of science and technology for sustainable economic development in the Islamic countries.
2. To provide a permanent forum for the elite researchers from the Islamic world in all disciplines of science to meet each other, exchange knowledge, address common concerns and develop and supervise realistic programmes for achieving excellence in scientific research.
3. To coordinate with individual scientists, research institutions and centers of scientific excellence in the Member States to establish effective scientific liaison among them and to provide necessary advise on all matters related to scientific research.
4. To act as an apex center for collection, collation and dissemination of high quality innovative research results, scientific knowledge and viable technologies to the Islamic countries.

5. To recognize the prominent researchers in the Islamic countries through the award of international science prizes, awards, medals etc.⁴⁶

2. FUIW:- The Federation of the Universities of the Islamic World

The Federation (FUIW) is a body working within the framework of the Islamic Educational, Scientific and Cultural Organization (ISESCO), specializing in supporting Universities and Higher Education institutions of the same level in the Islamic World and encouraging cooperation between them.

3. IBEST:- The Islamic Body on Ethics of Science and Technology

The Islamic Body on Ethics of Science and Technology (IBEST) is an ISESCO's body which is entrusted with the evaluation of scientific researches and applications in accordance with the Islamic principles and morals. The mission and main objectives of IBEST are:-

1. Directing the Muslim public opinion as regards the ethical aspects of some very important and crucial issues from the perspective of the Islamic Sharia.

⁴⁶ <http://www.isesco.org.ma/ICPSR/index.html>

2. Analysing thoroughly the risks involved by scientific and technological progress, with a view to preserving and protecting the identity of Muslim societies. The ultimate aim is to draw up the broadlines that will instruct the relevant scientific entities and raise the awareness of the public as regards these dangers.
3. Contribution towards coordination and exchange of viewpoints among national committees on ethics of science and technology, in connection with Islamic regional issues as well as problems addressed by international committees.
4. Building Islamic consensus on ethical issues related to science and technology, drawing on studies, research works and statistics conducted by the concerned committees and institutions in the Islamic countries.
5. Studying issues on practices related to medicine and biology, particularly as regards artificial insemination, cloning, environmental issues, informatics and other topical, crucial issues, in the light of the Islamic as well as the human ethical norms at large.
6. Urging educational institutions to introduce ethics in their teaching curricula, as part and parcel of the educational and training programmes of basic and higher education, with a view to enabling young scientists to further scientific research, while observing ethical norms and principles.

7. Setting up a database for ethics works that were prepared and published before in the Islamic countries, in particular, and at the international level;
8. Preparing a list of issues whose ethical aspects should be addressed from an Islamic perspective at the present time;
9. Instituting specialized committees to study the ethical aspects of issues which were not studied before or have been addressed and new developments occurred that have made their revision ethically an imperative;
10. Organizing international conferences to discuss contemporary ethical issues initially analysed by the committee;
11. Introducing ethics in science as an integral part of educational and training programmes in order to instil in the student community awareness and responsibility as regards the importance of ethical issues;
12. Adopting creation of ethics' committees to review ethical concerns and research works in the Islamic countries;
13. Conducting a media campaign as well as publishing guidelines, various analytical studies, simplified books and articles, to raise awareness and promote general consensus on ethical standards.⁴⁷

ISESCO is publishing a paper namely "*Islam Today*." It is almost a daily publication of ISESCO. It provides immediate

⁴⁷ http://www.isesco.org.ma/English/Sciences/Ethics/index_menu.htm

information of the Muslim world issues. The organization has also published almost 34 books on different scientific issues. The titles of these books are:

1. *ISESCO Guide for the Incorporation of Reproductive Health and Gender Concepts into Islamic Education Curricula*
2. *New Muslims*
3. *Renewable Energy Technologies for Developing Countries*
4. *Human Genome Social and Ethical Implications*
5. *The Languages of The Prophets and the Sources of the Divine Messages, Moses and Aaron - Jesus – Mohammad (Peace and Blessings Be Upon Them)*
6. *Islam and the West*
7. *The life of the Prophet*
8. *The Islamic Architecture and its Specificities in Teaching Curricula*
9. *Architects of the Scientific Thought in Islamic Civilization Hallmarks from the Biographies of Muslim Scholars in Various Ages*
10. *The Islamic World and the Sustainable Development*
11. *Basic needs for women Education*
12. *How holy is PALESTINE to the Muslims?*
13. *White book on Dialogue among Civilizations*
14. *An Analytical Study on Problems and Issues of Transfer of Scientific Research Results To The Production Sector*
15. *Islam as I came to know it, a religion of mercy and peace*
16. *Strategy of Islamic Cultural Action in the West*

17. *ISLAM : what it is*
18. *Political Education in Islam*
19. *ISLAMIC 'Waqf Endowment' Scope and Implications*
20. *Ethical Implications Of Human Embryo Research*
21. *Gene therapy The state of the art*
22. *Dialogue from Islamic Point of View*
23. *Parental Education in the Islamic World*
24. *Islam between Truth and False Allegations*
25. *Environmental studies some problems analyzed from the islamic point of view*
26. *A Study on Environmental Issues with Reference to the Qur'an and the Sunna*
27. *Islamic Perception of Child-Oriented Information*
28. *Reproductive health in islam*
29. *Water Resources Management*
30. *Future Prospects of Muslim-Western Dialogue*
31. *Towards A Sound Awakening*
32. *Sculpture and the making of statues from the islamic point of view*
33. *Al-QODS Al Shareef*
34. *A selected collection of drawings by children from the islamic world*

These books discuss current approaches to the problems of the world and every issue is explained under Islamic perspective.

5.6 Muslim Association for the Advancement of Science (MAAS)

Introduction

MAAS is the short form for the *Muslim Association for the Advancement of Science*. It was formed in 1983 for cultivating thinking Islamically about science and its related issues and ideas among working scientists. M. Zaki Kirmani was its founder Secretary .⁴⁸ The chief source of income of the MAAS is in the form of donations given by the philanthropists and its well-wishers. Amount received from the fees of different categories of MAAS membership and the sale of their publications also contribute significantly towards the income of the MAAS.⁴⁹

Aims, Objectives and Achievements of MAAS

The Muslim Association for the Advancement of Science (MAAS) has been founded with a view to introducing and strengthening the base of the science in masses in general and in the Muslims in particular by way of presenting it in psychologically acceptable manner and by making it culturally affinitive. In order to achieve its objectives, the Governing Council of the MAAS which is

⁴⁸www.cis-ca.org.

⁴⁹*Mass News Letters*, Aligarh, Muslim Association for the Advancement of Science, 1997, Vol.10, No.6, p. 4.

the sole responsible body for the management of its most affairs, takes decisions about its various activities. Some of the important activities undertaken by the MAAS since its inception in 1983 are as follows:⁵⁰

1. Publication of *MASS Journal of Islamic Science* since 1985

Today's science which has currency in the world is Western science. Because of Westoxification, this science shows those philosophical grounds which are categorically unacceptable before Muslims. Their philosophy, world-view and other social issues are distant different. It is therefore need of hour to evaluate and criticize this type of secular science and produce Islamic perspective explicitly. To fulfill this pressing need of hour the *Muslim Association for the Advancement of Science* started *MAAS Journal of Islamic Science*. Since its publication, it has established itself as a leading scholarly journal devoted to interdisciplinary exploration of the contemporary aspects of Islamic science. It publishes authoritative articles on the history, philosophy and sociology of science from the Islamic perspective, research work on the Islamization of knowledge, and critiques of Western science particularly on its impact on Muslim societies. Its article part is mostly contributed by world's distinguished personalities like *Sayid Husain Nasr, Zaiuddin Sardar, M. Zaki Kirmani, Dr. Rais Ahmad, Dr. Munawwar Ahmad Anees, S. Waqar*

⁵⁰*Idem*

A. Husaini, Osman Baker, Abdul Hamid A. Sulayman, Abdullab Omar Naseef etc. The journal has following aims and objectives:

1. Exposing valueless social characteristic of modern Western science.
2. Critical analysis of influences of advantages and disadvantages of modern Western science.
3. Explanation of Islamic science and its importance with critical and descriptive approach.
4. Pondering and thinking on *Qur'ān* and science or *Qur'ān* and Islamic science.
5. Multiplication of modern knowledge under Islamic world-view
6. Comparison and contrast between scientific and Islamic advances.
7. Study of scientific Muslim heritage.
8. Discussion for reconciliation among groups professing various views and approaches and denominations even in the same science.
9. Publish book reviews for aim related books.
10. Dissemination of science and Islamic science news from all over the world.

2. Publication of Journal *Ayat*

The *Centre for Studies on Science*, Aligarh in collaboration with the *Muslim Association for the Advancement of Science* started *Ayat* in Urdu

language for Urdu speaking people. Its objectives and targets are same as that of MAAS journal of Islamic science. However, the difference is only that *MASS Journal of Islamic Science* is in English language while as *Ayat* is in Urdu.

3. Publication of *MAAS Newsletter* since 1988.

It is a four page bimonthly publication of MASS. It provides immediate information of MAAS council meetings, thesis submitted, symposiums, conferences, young Muslim scientist awards, best paper awards, MAAS scholarship and other world scientific news.

4. Publication of a quarterly Journal *Chemical & Environmental Research* since 1992.

5. Institution of *Young Muslim Scientist Award* (YMSA) since 1988.

6. Institution of *MAAS Best Paper Award* (BPA) since 1991.

7. Distribution of Scholarship for Science Students from class IX to *M.Sc* & also for *M.Phil/Ph.D* Students.

Distribution of scholarship is prepared for the encouragement of youngsters and felicitation of the toppers of class X and XII science students. These steps would make a motivating force; it is expected by the members of MAAS.⁵¹

⁵¹ *Mass News Letters, op. cit.*, May – June 2001, Vol.14, No.3, p. 3.

8. Holding Science Orientation -- Workshop.
9. Grants for Research Projects.
10. International *Journal of Life Science*⁵²

Starting in 1993 this biannual journal provides a forum for the publication of original and articulated papers, short communications and review articles of high quality in various areas of life science (pure and applied aspects). The official language of the journal is English. However, a short summary in any other language may also be included if provided by the author.

⁵²*Ibid.*, January – February 1993, Vol.6, No.1, p. 8.

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the name of Allah, the Compassionate, the Merciful

CHAPTER 5

CONCLUSION

Islam is the divine and eternal religion that guides the whole mankind to the Right Path. It is a complete code of life. It stands for complete submission and surrender to the Will of Allah, the almighty. Besides other dimensions, Islam encourages the man to ponder over his own creation and the creation of the *āfāq* (universe) and whatever is therein. The man being the best creation (اشرف المخلوقات) is bestowed with the gift of intellect, reasoning, power and logic besides other inevitable requirements by his Creator (خالق).

Allah (S.W.T.) is the Ultimate Reality. The world being His creation, He is constantly supervising and overseeing it. Man being His vicegerent owes accountability to Him for all his deeds related to Him, his fellow beings and many other things around. Revealed knowledge, the *Qur'an*, is the book of guidance for him and he has to understand and assimilate the ideas ingrained in it and pattern his life within its parameters. The series of guidelines in the *Qur'an* is the perfect and supreme form of knowledge – unchangeable and unquestionable. The objects of the vast expanse around us are some of His signs. Man is duty bound to study them in the light of his relations with environment. Of course, the nature of the relationship is to be determined and explained by the holy *Qur'an*.

The *Qur'an* inspires the man to study his *nafs* (self) and *āfāq* (universe) in a scientific and objective manner. This study can generate operational Muslim science that reflects our needs, norms,

hopes, values and true vision. Thus, eventually leads to the emergence of true and real consciousness in the Muslim *Ummah* that can contribute to the revival of Islamic culture, science, and finally value based civilization.

We must sincerely present Islamic science in all its intellectuality and make no unwarranted and servile compromises with modern valueless ideologies. Islam prompts to seek the knowledge of the essence of things in relation to their divine origin.

The introduction of Islamic ethics and values in the science, technology, education, professional practice, policy-formulations, etc needs to be thought out, planned, and implemented with great care, wisdom, and in an organized manner.

The legacy of Muslims is, however, subject to critical scrutiny on the basis of the *Qur'ān* and the *Sunnah*. True objectives cannot be realized unless Muslims fulfill certain preconditions. People, including the average Muslims, generally imagine contemporary era as a new age, an age of advancement and enlightenment. They commit the mistake of judging the worth of this era in the light of material considerations instead of spiritual and intellectual ones.

In the contemporary scenario the Muslim world is confronted with complex challenges. Muslim science centers, in the light of their experience during last two decades, need to become more vibrant institutions in their respective fields, and they need to adopt

appropriate policies and take relevant decisions in this connection, in such a way as to open new vistas for the Muslim world.

Muslims must channelize their energies in three effective directions in the Muslim world, namely increased interest in Internet-assisted distance education, promotion of education throughout the world even in the remotest areas, consolidation of the bases of the Muslim culture, development of libraries, further interest in the civilizational heritage of the Islamic world and endeavors to ensure an active presence in the culture of sciences. The Arabic language which is the historical language of Islamic scientific and cultural ethos and is broadly spoken in large parts of the Muslim world needs due recognition and patronage.

The fields of competence of the Islamic Organizations, namely; education, sciences, culture and communication, are the bridges to the future and the means of elevating our Islamic *Ummah*. The Islamic scientific and technological reference deserves serious attention for its accommodation in the entire future planning's of the Islamic Organizations. It can consequently ensure to integrate the efforts of Muslims and enable the Muslim *Ummah* to achieve its objectives in the future as well.

The Muslim world today is at the cross roads. In fact, it is struggling with developmental problems and their repercussions, facing global challenges and complications, rejecting false accusations and warding off tendentious campaigns. At the same time, it is

endeavouring to improve its conditions and build up its entity amidst adverse international and regional circumstances, and within a global atmosphere mobilized against its vital interests, the stability of its societies, as well as against the security, sovereignty and territorial safety of its countries. The Muslim world cannot aspire to a high status in this atmosphere without efficient solidarity, beneficial cooperation, well-devised integration and precise coordination within the framework embodied in the lofty Islamic principles.

It is imperative to enrich knowledge in the Muslim States by updating curricula and generalize schooling so that Muslim societies are empowered to enter the age of information and communication. Consolidating the relations of cooperation and exchange of experiences among Muslim States is the key to success. The Qur'anic world-view, the Qur'anic methodology, and the Qur'anic epistemology need to be emphasized by all standards. The *Qur'an* guides that *'ilm* (knowledge) begins with *imān* (belief) which is firmly based upon *tawḥīd*.

Thus, whatever is obtained through revelation, observation, experimentation, experience and measurement has to be collated in the *Qur'an* to seek intelligence and wisdom. If the world is studied with this methodology and the knowledge thus obtained is developed in correspondence with the Qur'anic world-view then it is highly appreciable, significant and inevitable for establishing man's *khilafah* on the earth.

For a Muslim, science is purpose-oriented, just as all his activities are purpose oriented. A Muslim is a discriminating person in the sense that he must always endeavor to distinguish *Haqq* (right) from *bā'il* (wrong) and beneficial from harmful. In the words of Prophet Muhammad (S.A.W.S) “He who is not merciful to others, will not be treated mercifully.”¹ Science simply for the sake of science, with no thought given to its purpose or its consequences does not fit into the Muslim scientists' world-view. Islamic science is real, and different.

The world is embarking on an era where the advocates of racism, religious fanaticism, and intellectual and civilization isolation are spreading allegations and fallacies that only kindle the fires of hatred and enmity among the human beings. They deliberately promote unrest and purposefully cast doubts about historical facts and moral values. Those who do not know these facts and values find themselves in a quandary, torn between the radiance of faith, conviction and knowledge, and the darkness of doubt, fanaticism and ignorance, between tolerance, mutual understanding and dialogue and cooperation on the one hand, and hatred, racism, sectarian conflict and intellectual disputes on the other. This situation is of great concern and reflects the defectiveness of the international relations, the chaos of intellectual safety and cultural peace, and the dangerous

¹ Isma'il Al-Bukhāri, *Sahih Al-Bukhari*. Riyadh, Saudi Arabia, Maktab Dar-us-Salam, 1994, vol.8, Hadith no. 42, p.956.

discrepancy between the values, principles, ideals and theories addressed today and adopted by the international community, and a reality that is replete with deviations in thought, erratic behaviour and an inclination for misleading minds, distorting the truth and baffling the international public opinion. Such a situation is unprecedented in world history, not only in its scope but also in that strange perseverance to promote evil, committing cruel injustice, and overusing deception and betrayal under pretexts that were used in the past to impress and befuddle the minds of the people who are devoid of any bias and prejudice.

Science, be it theoretical or experimental, has a special place in the Islam. Muslims' interest in experimental science throughout the golden age of Islam reached to such heights that were never achieved by any other civilization. This may be ascribed to a host of reasons among which is Islam's concern in its basic teachings regarding the status of man who is considered the noblest of all creatures. Other reasons are related to the scientific and empirical methods which Muslim scientists initiated. Therefore, the efforts exerted by different Islamic centers in this field constitute the modern new extension of an old cultural endeavour.

We turn to our past not be locked up in it but to take from it provision for our future. In other words, we do not look back to our yesterday in order just to glorify it, but to benefit from it. Even in the field of empirical science, our scholars dive deep into the

tradition then come up with new pearls that enrich the present. Our heritage of scientific knowledge still has a lot to give even today when science has reached the zenith of its advancement.

May Allah the Almighty bestow on us success in order to achieve progress and prosperity for our glorious *Ummah* and to humanity at large.

GLOSSARY

Aerodynamics: Branch of fluid mechanics that deals with the motion of air and other gaseous fluids, and with the forces acting on bodies in motion relative to such fluids. The motion of an airplane through the air, the wind forces exerted on a structure, and the operation of a windmill are all examples of aerodynamic action.

Algorithm: Systematic procedure that produces – in a finite number of steps – the answer to a question or the solution of a problem.

Amputation: Process of cutting off a limb or other appendage of the body, especially in a surgical operation.

Anaesthetic: A substance that reduces sensitivity to pain and may cause unconsciousness, especially a drug used in medicine.

Annular eclipses: A solar eclipse in which all but the outermost rim of the sun is blocked by the moon, leaving a ring of sunlight visible around the moon.

Apogee: farthest point from the earth.

Apsides: In astronomy, either of the two points on an elliptical orbit that are nearest to, and farthest from, the focus, or centre of attraction.

Artificial Satellite: Any object purposely placed into orbit around Earth, other planets, or the Sun. Since the launching of the first

artificial satellite in 1957, thousands of these “man-made moons” have been rocketed into Earth orbit. Today, artificial satellites play key roles in the communications industry, in military intelligence, and in the scientific study of both Earth and outer space.

Background Radiation: Long wavelength electromagnetic radiation that hits the earth uniformly from all directions. Background radiation represents energy left over from the “big bang,” the explosion at the beginning of the universe. Electromagnetic radiation is energy that moves in oscillating waves at the speed of light, and it includes light, radio waves, and microwaves. Background radiation is most intense at microwave wavelengths. The microwave part of the electromagnetic spectrum is equivalent to the shortest wavelength radio waves. Microwaves have considerably longer wavelengths than visible light. In addition to microwave background radiation, radio and infrared (shorter than microwave) background radiation also exist.

Calculus: Branch of mathematics.

Cauterization: Process of sealing or destroy abnormal or infected tissue, with a heated instrument, a laser, an electric current, or a caustic substance.

Chord: Geometry line through arc.

Comet: (Latin stella cometa, “hairy star”), relatively small, icy celestial body revolving around the Sun. When a comet nears the Sun, some of the ice in the comet turns into gas. The gas and loose

dust freed from the ice create a long, luminous tail that streams behind the comet.

Computer: Machine that performs tasks, such as calculations or electronic communication, under the control of a set of instructions called a program. Programs usually reside within the computer and are retrieved and processed by the computer's electronics. The program results are stored or routed to output devices, such as video display monitors or printers. Computers perform a wide variety of activities reliably, accurately, and quickly.

Cotangent: A trigonometric function that for an acute angle is the ratio between the leg adjacent to the angle when it is considered part of a right triangle and the leg opposite.

Cretaceous Period: In geology, latest time period of the Mesozoic era, lasting from about 138 million to about 65 million years before present. The name alludes to the abundance of chalk (Latin *creta*) strata deposited during the latter part of the period in England and France and now exposed at sites such as Dover. In Europe and North America, geologists divide the period into an Early (144 to 97 million years ago) and a Late Cretaceous (97 to 65 million years ago).

Dead Sea: Salt lake in southwestern Asia. Bounded on the west by Israel and the West Bank and on the east by Jordan, the Dead Sea forms part of the Israeli-Jordanian border. The surface of the Dead Sea, 408 m (1,340 ft) below sea level as of 1996, is the

lowest water surface on earth. The lake is 80 km (50 mi) long and has a maximum width of 18 km (11 mi); its area is 1,020 sq km (394 sq mi). The Dead Sea occupies a north portion of the Great Rift Valley. On the east the high plateau of Moab rises about 1,340 m (about 4,400 ft) above the sea; on the west the plateau of Judea rises to half that height. From the eastern shore a peninsula juts out into the lake. To the south of this peninsula the lake is shallow, less than 6 m (less than 20 ft) deep; in the north it reaches its greatest depth of 399 m (about 1,309 ft) below surface level, and 799 m (about 2,621 ft) below sea level.

Decantation: Process of pouring a liquid gently and carefully from one container to another so as not to disturb sediment.

Dinosaur: One of a group of extinct reptiles that lived from about 230 million to about 65 million years ago. The word dinosaur was coined in 1842 by British anatomist Sir Richard Owen, derived from the Greek words *deinos*, meaning “marvelous” or “terrible,” and *sauros*, meaning “lizard.” For more than 140 million years, dinosaurs reigned as the dominant animals on land. Owen distinguished dinosaurs from other prehistoric reptiles by their upright rather than sprawling legs and by the presence of three or more vertebrae supporting the pelvis, or hipbone. Dinosaurs are classified into two orders according to differences in pelvic structure: Saurischia, or lizard-hipped dinosaurs, and Ornithischia, or bird-hipped dinosaurs. Dinosaur bones occur in sediments that were deposited during the

Mesozoic Era, the so-called era of middle animals, also known as the age of reptiles. This era is divided into three periods: the Triassic (240 million to 205 million years ago), the Jurassic (205 million to 138 million years ago), and the Cretaceous (138 million to 65 million years ago).

Ellipse: Geometry shape resembling oval.

Equinox: 1: either of the two points on the celestial sphere where the celestial equator intersects the ecliptic. 2: either of the two times each year (as about March 21 and September 23) when the sun crosses the equator and day and night are everywhere of equal length

Estuary: semi enclosed coastal area, where seawater mixes with fresh water from rivers; also, the tidal area of the lower part of a river. There are usually three overlapping zones in an estuary: an open connection with the sea where marine water preponderates, a middle area where strong salt water and fresh water mix, and a tidal river zone where fresh water preponderates. Tidal forces create variable estuarine characteristics in sea inlets. Variation in the seasonal discharge of rivers causes the limits of these zones to shift, and this increases the overall ecological complexity of estuaries. Estuaries are highly productive ecosystems, accounting for one-half of the living matter of the world's oceans.

Euclid: He was the most prominent mathematician of Greco-Roman antiquity, best known for his treatise on geometry, the Elements. He flourished in c. 300 BC, Alexandria, Egypt.

Imponderability: Phenomenon which cannot be weighed physically.

Khilafah: Signifies man's vicegerency of Allah's attributes. Man is charged with the responsibility of sustaining himself and other creatures of the globe faithfully according to the divine characteristics of Allah. The faithful execution of this sublime responsibility is, in fact, the true nature of *ibadat* (worship) in Islam.

Latent heat: A number of physical changes are associated with the change of temperature of a substance. Almost all substances expand in volume when heated and contract when cooled. The behavior of water between 0° and 4° C (32° and 39° F) constitutes an important exception to this rule. The phase of a substance refers to its occurrence as either a solid, liquid, or gas, and phase changes in pure substances occur at definite temperatures and pressures. The process of changing from solid to gas is referred to as sublimation, from solid to liquid as melting, and from liquid to vapor as vaporization. If the pressure is constant, these processes occur at constant temperature. The amount of heat required to produce a change of phase is called latent heat, and hence, latent heats of sublimation, melting, and vaporization exist. If water is boiled in an open vessel at a pressure of 1 atm, the temperature does not rise above 100° C (212° F), no matter how much heat is added. The heat that is absorbed without changing the

temperature of the water is the latent heat; it is not lost but is expended in changing the water to steam and is then stored as energy in the steam; it is again released when the steam is condensed to form water. Similarly, if a mixture of water and ice in a glass is heated, its temperature will not change until all the ice is melted. The latent heat absorbed is used up in overcoming the forces holding the particles of ice together and is stored as energy in the water. To melt 1 g of ice, 79.7 cal are needed, and to convert 1 g of water to steam at 100° C, 541 cal are needed.

Lunar eclipse: Eclipse of the moon – an eclipse of the moon caused by the earth passing between the sun and the moon and casting its shadow on the moon.

Midwifery: The technique or practice of helping to deliver babies and offering advice and support to pregnant women.

Milky Way: The large, disk-shaped aggregation of stars, or galaxy, that includes the Sun and its solar system. In addition to the Sun, the Milky Way contains about a trillion other stars. Its name is derived from its appearance as a faintly luminous band that stretches across earth's sky at night. This band is the disk in which the solar system lies. Its hazy appearance results from the combined light of stars too far away to be distinguished individually by the unaided eye. The individual stars that are distinct in the sky are those in the Milky Way Galaxy that lie sufficiently close to the solar system to be discerned separately.

Nebula: In astronomy, a localized conglomerate of the gaseous and finely divided dust particles that are spread throughout interstellar space. Before the invention of the telescope, the term nebula (Latin, “cloud”) was applied to all celestial objects of a diffuse appearance. As a result, many objects now known to be star clusters or galaxies were called nebulas.

Obliquity of the ecliptic: The angle between the planes of the earth’s equator and orbit having a value of about $23^{\circ}27'$.

Orthographic: Graph composed of vertical lines.

Paraboloid: Geometric surface: a mathematical surface in which intersections with planes produce parabolas, ellipses, or hyperbolas.

Phlogiston: In early chemical theory, hypothetical principle of fire, of which every combustible substance was in part composed. In this view, the phenomena of burning, now called oxidation, was caused by the liberation of phlogiston, with the dephlogisticated substance left as an ash or residue.

Ptolemy: Egyptian astronomer, mathematician, and geographer of Greek descent who flourished in Alexandria during the 2nd century AD. In several fields his writings represent the culminating achievement of Greco-Roman science, particularly his geocentric (Earth-centered) model of the universe now known as the Ptolemaic system. Virtually nothing is known about Ptolemy's life except what can be inferred from his writings. His first major astronomical work, the *Almagest*, was completed about AD 150

and contains reports of astronomical observations that Ptolemy had made over the preceding quarter of a century. The size and content of his subsequent literary production suggests that he lived until about AD 170.

Prostate Gland: Chestnut-shaped male organ located next to the bladder and surrounding the urethra (the tube that carries urine from the bladder to the penis). The prostate gland produces a secretion known as prostate fluid that makes up most of the liquid part of semen, which is discharged from the penis during sexual orgasm. Measuring about 3 cm (about 1.2 in) across, the prostate gland is composed of both glandular tissue that produces prostate fluid and muscle tissue that helps in male ejaculation. Prostate fluid also helps to keep sperm, which is found in semen, healthy and lively, thereby increasing the chances that fertilization will occur.

Quasars: A compact object in space, usually with a large red shift indicating extreme remoteness, that emits huge amounts of energy, sometimes equal to the energy output of an entire galaxy.

Redshift: Change or shift, in the light radiated by an object, such as a star or galaxy that indicates the object's motion. Scientists have used redshifts to measure the velocities (speed and direction) of distant galaxies. Knowing the velocities of galaxies helps astronomers understand how the universe is changing. This

knowledge allows scientists to interpret the distant past of the universe and to predict the universe's distant future.

Richter Scale: Method of ranking the strength or size of an earthquake. The Richter scale, also known as the local magnitude scale, was devised in 1935 by the American seismologist Charles F. Richter to rank earthquakes occurring in California. Richter and his associates later modified it to apply to earthquakes anywhere in the world.

Rocket: Self-propelled device that carries its own fuel, as well as the oxygen, or other chemical agent, needed to burn its fuel. Most rockets move by burning their fuel and expelling the hot exhaust gases that result. The force of these hot gases shooting out in one direction causes the rocket to move in the opposite direction. A rocket engine is the most powerful engine for its weight. Other forms of propulsion, such as jet-powered and propeller-driven engines, cannot match its power. Rockets can operate in space, because they carry their own oxygen for burning their fuel. Rockets are presently the only vehicles that can launch into and move around in space.

Seminal vesicles: are small sacs that hold semen.

Solar eclipse: An eclipse in which the moon blocks all or part of the sun's light from reaching the earth's surface, because it passes directly between the earth and the sun.

Solar System: The Sun and the celestial bodies orbiting the Sun, including the nine planets and their satellites; the asteroids and comets; and interplanetary dust and gas. The term may also refer to a group of celestial bodies orbiting another star.

Space Station: Any facility that enables humans to live in space for long periods of time. Space stations are used as laboratories where scientific and engineering experiments are conducted and as servicing centers where spacecraft can be repaired, upgraded, or even constructed. Space stations are expected to one day act as spaceports where spacecraft can pick up and deliver people, cargo, and fuel on the way to or returning from distant destinations, such as Mars.

Statics: In physics, the subdivision of mechanics that is concerned with the forces that act on bodies at rest under equilibrium conditions. The methods and results of the science of statics have proved especially useful in designing buildings, bridges, and dams, as well as cranes and other similar mechanical devices. To be able to calculate the dimensions of such structures and machines, architects and engineers must first determine the forces that act on their interconnected parts. Statics provides the analytical and graphical procedures needed to identify and describe these unknown forces.

Stypics: Able to stop bleeding.

Sublimation: Conversion of substance from the solid to vapour state with its becoming liquid e.g. vaporization of frozen CO_2 (dry ice) at ordinary atmospheric pressure and temperature.

Sundials: The earliest type of timekeeping device which indicates the time of day by the position of the shadow of some object exposed to the sun's rays.

Testis: Also called **testicle**, one of a pair of male sex glands that produce sperm cells. Testes are present in most animals. In backboned animals the testes produce male sex hormones, called androgens, as well as sperm. In man the testis is an oval organ about 5 cm (about 2 in) long. During embryonic development it is located in the abdominal cavity, but about a month before birth it normally descends into a pouch of skin called the scrotum. Each testis contains about 800 narrow twisting tubes, called seminiferous tubules that are lined with cells that, upon maturation, divide to form the sperm. The seminiferous tubules merge and form a larger tube, the epididymis. Sperm travels from the testis through the epididymis to the vas deferens, which carries the sperm to the urethra. Sperm exits from the urethra during ejaculation (the release of semen during orgasm). In man the sex hormone produced by the testis is testosterone, which controls the growth of the male reproductive system and stimulates the development of the male secondary sexual characteristics, such

as the growth of the beard, the deepening of the voice, and the male contours of the body. It also influences male sexual behavior.

Trepidation: A tremulous motion, a discrete small movement.

Ummah: The ensemble of Muslim individuals and communities forming a entity of common culture, legal system, jurisprudence etc. and a certain self- consciousness but not necessarily a coincident common polity.

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