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**786**

**Geographical Science and the Holy Qur'an:  
An Experimental Study of Physical & Agricultural Geography  
in the Holy Qur'an.**

**By  
Tabasam Jamal Shad**

**Thesis submitted for the degree of Doctor of Philosophy  
Glasgow University  
Department of Arabic and Islamic Studies  
October, 1997**

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## ABSTRACT

This study comprises, to the best of my knowledge, of the first attempt to examine the scientific geographical aspects of the Holy Qur'ān.

Many parallels can be drawn between the growth of modern scientific knowledge and the ideas of the Holy Qur'ān. From a methodological point of view, both revere the role of the human understanding as a primary source of truth. From an empirical point of view both recognise the role of observation and experiment. The world of both is the world of our practical and spiritual engagement; a world that begins with the primitive ontology of actual life. This Qur'anic world begins with primary substances recognisable to the human subject: the earth, the sky, the sun, moon, stars, mountains, wind and clouds. The present thesis will organise its concerns within the following, equally fundamental, categories: rainfall, sedimentation and plant production.

The essential primitiveness of the objects which populate the ontology of geographical science renders its subject matter easy to ordinary understanding. This ease is, of course, relative to the contingent nature of the human creature and the affairs of his practical existence, and it is just for that reason that these subjects are chosen. The presence of these primitive and practical objects in the Qur'ān fuses the concerns of that holy book with those of the geographer. Yet, there is here a difficulty of reference: in what sense is the earth of the theologian the earth of the scientist? In what follows it will be suggested that a solution is possible to this puzzle; for it is not that the scientific content is inherently disguised or tacit or mystical in the Qur'ān, it is that its apparent hiddenness is a result of lack of thinking, understanding

and of translations skewed in favour of a religious interpretation. Thus, it is suggested that the science of the Qur'ān is of a firmer and more explicit kind than that generally attributed to it. The Qur'ān is a work of science and a work of theology, a dilemma which is itself overcome by a proper understanding of its verses.

The research presented here supports the thesis that conventional translations of the Qur'ān have tended to obscure the scientific content of the original. The scientific meaning of some passages has been lost in the process of translation, even where the science was most clearly present in the original Arabic text. It appears that religious translators have lacked the basic knowledge of geography which would have allowed them to imbue the Qur'anic verses with their specific geographical sense. Such translations are to be faulted on the grounds that they underrate the scientific content of the Qur'ān.

What is true of geography is also true of medicine, and translations have also failed to do justice to the scientific medical content of the Qur'ān.

A medical translation of the Qur'ān has been carried out by Dr. Mohammed Ali Albar (*Human Development, As Revealed in the Holy Quran and Hadith: the Creation of Man between Medicine and the Quran*)

It can be shown, beyond doubt, that there is true science in the Holy Qur'an. Geographical knowledge present in the Holy Qur'ān 1400 years ago is only now being rediscovered by modern science as this thesis attempts to prove.

To be specific, it is according to the following plan that the relevant aspects of this study are approached.

1. Introduction
2. The Holy Qur'ān and Scientific Investigation.
3. Rainfall.
4. Sedimentation.
5. Plant Production.
6. Conclusion and Proposals.

## **DEDICATION**

To my Supervisor Professor John N Mattock, a constant source of inspiration, whose unconditional sport, indefatigable encouragement, and continuous appreciation saw me through the most difficult stages of this project. This work is, in all manners and respects, the fruit of his suggestions and instructions and is hereby dedicated to him as a token of love and gratitude.



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### **The Food, 5:97**

This is that you may know that Allāh knows whatever is in the heavens and whatever is in the earth, and that Allāh is the Knower of all things.

### **The Originator, 35:28**

Those of His servants only who are possessed of knowledge fear Allāh; surely Allāh is Mighty, Forgiving.

### **Ibrahim, 14:32, 34**

32. Allāh is He Who created the heavens and the earth and sent down water from the clouds, then brought forth with it fruits as a sustenance for you, and He has made the ships subservient to you, that they might run their course in the sea by His command, and He has made the rivers subservient to you.

34 And He has made subservient to you the sun and the moon pursuing their courses, and He has made subservient to you the night and the day. And He gives you of all that you ask Him; and if you count Allāh's favours, you will not be able to number them;

(S. H. Shakir)

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CHAPTER NO: 1  
INTRODUCTION



**7.185**

Do they see nothing in the government of the heavens and the earth and all that God hath created? (Do they not see) that it ay well be that their terms is nigh drawing to an end? In what message after this will they then believe?

Ali, A. Yousuf

## 1.1 INTRODUCTION

The Qur'ān gives a high rank to knowledge and inspires men to acquire it. It instructs one to think, to observe and to discover. By means of observations one will discover signs of the creator. The world is a theophany itself, a text, so to speak, containing indications of scientific and religious significance.

The Qur'ān implicitly recognises the importance of research, and is specific enough to isolate its two principle components: experience and intellectual construction. According to Muslim theology, not only is the empirical world given as an indicator of an intelligent structural concatenation, but also the human creature as a thinking being is given the intelligence to grasp reality of this concatenation. This intellectual gift is neglected at one's peril. If one does not utilise the rational component of the human essence, one fails in a sense to be human at all, and one becomes an object among others rather than a sentient observer of the universe. Consequently, it is stated in the Qur'ān that Allāh is angry with those who do not observe the universe aright; they are classified as dead persons.

Do they see nothing in the government of the heavens and the earth and all that God hath created? (Do they not see) that it may well be that their terms is nigh drawing to an end? In what message after this will they then believe?

(7: 185)

It is wrong to say then, that the Qur'ān is merely a book of religion, or that it instructs only on religion and ethics. For it is a book

which inspires the scientific mind and gives an impetus to the understanding of the universe, as is indicated in the following verses:

Say: "Travel through the earth and see how God did originate creation; so will God produce a later creation: for God has power over all things.

(29: 20)

And the heaven, He raised it high, and He made the balance

(55: 7)

He Who created the seven heavens one above another: No want of proportion wilt thou see in the Creation of (God) Most Gracious. So turn thy vision again: seest thou any flaw?

(67: 3)

Again turn thy vision a second time: (thy) vision will come back to thee dull and discomfited, in a state worn out.

(67: 4)

And the earth We have spread out (like a carpet); set thereon mountains firm and immovable; and produced therein all kinds of things in due balance.

(15: 19)

And We have provided therein means of subsistence,-for you and for those for whose sustenance ye are not responsible.

(15: 20)

And there is not a thing but its (sources and) treasures (inexhaustible) are with Us; but We only send down thereof in due and ascertainable measures.

(15: 21)

And We send the fecundating winds, then cause the rain to descend from the sky, therewith providing you with water (in abundance), though ye are not the guardians of its stores.

(15: 22)

Do they not look at the Camels, how they are made?-

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?

(88: 17-20)

Or, Who has made the earth firm to live in; made rivers in its midst; set thereon mountains immovable; and made a separating bar between the two bodies of flowing water? (can there be another) god besides God? Nay, most of them know not.

(27: 61)

It is We Who have set out the zodiacal signs in the heavens, and made them fair-seeming to (all) beholders;

(15: 16)

And We have made, above you, seven tracts; and We are never unmindful of (our) Creation.

(23: 17)

Do they not look at the sky above them? How We have made it and adorned it, and there are no flaws in it?

And the earth- We have spread it out, and set thereon mountains standing firm, and produced therein every kind of beautiful growth (in pairs)

(50: 6-7)

See ye not how God has created the seven heavens one above another,

And made the moon a light in their midst, and made the sun as a (Glorious) Lamp?

(71: 15-16)

Do not the Unbelievers see that the heavens and the earth were joined together (as one unit of creation), before we clove them asunder? We made from water every living thing. Will they not then believe?

(21: 30)

It is the first step towards science.

## 1.2 VERSES ABOUT THE UNIVERSE

Early Muslims looked to the Qur'ān for advice concerning how to understand the universe. The Qur'ān inspired them to develop educational methods, to conceive inventions and to undertake research.

The following verses confirm this assertion.

1. 29.20. Say: Travel in the earth and see how He makes the first creation, then Allah creates the latter creation; surely Allah has power over all things.

(29:20)

2. 10.101. Say: Consider what is it that is in the heavens and the earth; and signs and warners do not avail a people who would not believe.

(10:101)

In both verses there is an incitement to research. The first concerns the creation of the universe including the sky, the sun, the moon, the stars, the earth, human beings, animals, birds, insects and plants. The second verse asks us to consider the relations between heaven and earth.

More verses dealing with thinking about the universe are cited below.

3. 50.7. And the earth, We have made it plain and cast in it mountains and We have made to grow therein of all beautiful kinds,

4. 50.8. To give sight and as a reminder to every servant who turns frequently (to Allah).  
(50:7-8)
5. 3.190. Most surely in the creation of the heavens and the earth and the alternation of the night and the day there are signs for men who understand.
6. 3.191. Those who remember Allah standing and sitting and lying on their sides and reflect on the creation of the heavens and the earth: Our Lord! Thou hast not created this in vain! Glory be to Thee; save us then from the chastisement of the fire:  
(3:190-191)
7. 2.164. Most surely in the creation of the heavens and the earth and the alternation of the night and the day, and the ships that run in the sea with that which profits men, and the water that Allah sends down from the cloud, then gives life with it to the earth after its death and spreads in it all (kinds of) animals, and the changing of the winds and the clouds made subservient between the heaven and the earth, there are signs for a people who understand.  
(2:164)
8. 21 30. Do not those who disbelieve see that the heavens and the earth were closed up, but We have opened them; and We have made of water everything living, will they not then believe?  
(21:30)
9. 12.105. And how many a sign in the heavens and the earth which they pass by, yet they turn aside from it.  
(12:105)
10. 7.185. Do they not consider the kingdom of the heavens and the earth and whatever things Allah has created, and that may be their doom shall have drawn nigh; what announcement would they then believe in after this?  
(7:185)

11. 57.25. Certainly We sent Our apostles with clear arguments, and sent down with them the Book and the balance that men may conduct themselves with equity; and We have made the iron, wherein is great violence and advantages to men, and that Allah may know who helps Him and His apostles in the secret; surely Allah is Strong, Mighty.

(57:25)



### 1.3 IMPORTANCE OF THE HOLY QUR'ĀN

Read: In the name of thy Lord Who createth.

(96:2)

And He (Allah) taught Adam the names of all things.

(2:31)

And He taught man that which he knew not.

(96:5)

The first word of the Qur'anic revolution is "read" (iqra'). Due to this word, an educational revolution was spread throughout the Islamic world. The early Muslims began to learn the Qur'ān by heart. They began to reflect upon the meaning and contemplate upon the verses. They also began to acquire knowledge and to speculate about the universe. In this way they took their first steps towards scientific knowledge and provided the permanent base of science.

Allāh Almighty taught the names of all things (which the angels did not know) to Adam. First, Allāh gave direct knowledge to man. Second, He provided the Holy Qur'ān to give knowledge and information for the benefit of all humanities.

The Qur'ān enjoins us to think, and in consequence, I have been inspired to research on geographical science and the Qur'ān and to develop conceptual links between them. Because this type of

research has not been undertaken before, that which is actually present in the Qur'ān has hitherto been overlooked.

The Qur'ān presents itself as a guide for mankind as a whole. It is not for any one race or class of people. It is not for any one place or period of time. It addresses all people. In particular, it is for those who are conscious of God and who believe in the existence of that which is beyond the reach of human perception. From the beginning, it puts man face to face with reality as a whole.

Yet the Qur'ān does not require people to believe blindly. It is addressed to people who consider their perceptions of the world, and who ponder the implications of the phenomena of the earth, the mountains, the clouds, the sky, the sun, the moon, and the planets in their orbits, the alternation of night and day, and the parched earth brought to life after a shower of rain. It asks us to reflect upon the beginnings of our own life. It asks us to reflect upon the seeds we sow, the water we drink, the food we eat, and all the other innumerable signs of creation and the innumerable instances of the Creator's grace and bounty.

Have you watched the seeds which you grow?

(56:63)

The water you drink?

(56:68)

Again and again we are asked to observe, to think and to question. Why should man believe in a single Creator, Who is eternal, beneficent, compassionate, loving and just? Why should it not be

one or more of the many other gods in which people believe? Why should not the arguments of the materialists and those who deny the existence of God be correct? Almost the whole of the Qur'ān is addressed to these questions.

Throughout, the Qur'ān stresses knowledge and reason as the valid way to interpret faith and consciousness of Allāh.

"Only those of the servants of God who possess knowledge are the ones who truly stand in awe of Him"

(35:28)

#### **1.4 SCIENCE AND THE HOLY QUR'ĀN**

The Qur'ān clearly establishes the fact that science and the Qur'ān are two aspects of the same Truth and that there is no contradiction between them. The first revelation of the Qur'ān inspired the prophet of Islam to acquire knowledge and emphasised the importance of learning in human life. (96: 1-5) It also enjoined him to pray to Allāh for an increase in knowledge. (20: 114) According to the Qur'ān, only men of knowledge really fear Allāh. (35: 28) They observe and see Signs and Attributes of Allāh both in the Qur'ān and in the material universe. They reflect on and understand the parables of the Qur'ān and the manifestations of Allāh around them and draw the correct conclusions from them. (29: 43)

The Qur'ān makes it absolutely clear that the whole material structure is full of signs of Allāh but that only men of knowledge may observe them and understand them. It invites them to meditate on them (4: 82) on all of His creation:

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?

(88: 17-20)

Thus, the Qur'ān introduces new dimensions into the pursuit of knowledge and its philosophy and seeks to bring men of knowledge closer to Allāh through the study of His attributes and manifestations in the material world.

The Qur'ān gives new impetus to the study of physical phenomena and helps men's minds to cross the barriers of the material. All the

universe is the creation of God, and the Qur'ān invites man to observe it and to discover its mysteries, and to endeavour to use its widespread resources for his benefit. Thus the Qur'ān leads man to God by means of His creation, and the concrete realities that are found in the earth and the heavens. True science observes and deduces physical laws on the basis of this observation. Science thus reaches the Creator by observing with great precision and exactness the laws governing natural phenomena and the Qur'ān illustrates the functioning of these laws throughout His Creation. So there is a close relationship between the words of the Qur'ān and the laws of the universe.

## 1.5 INDIVIDUAL SCIENCES AND THE HOLY QUR'ĀN

Although the Holy Qur'ān is not a scientific book, it contains scientific information on a wide range of subjects, including Physics, Chemistry, Botany, Biology, Astronomy, Economics, Sociology, Geology, Mineralogy, Zoology, Agriculture and Geography.

### 1.5.1. GEOLOGY

The Qur'anic revolution is particularly relevant in the field of geology, for it is here that the fusion between abstract conception and applied science first bears fruit. The driving principle of the One absolute truth provides the impulse towards the investigation of the underlying principles. Thus, the operations of nature are fully revealed.

The fusion of thought and action is mirrored in the Qur'ān by the unity of science and religion. The "Oneness" of the universe is at once a divine and natural principle. Moreover, a further unity is achieved by the fusion of divine action with scientific reality. Thus, the world has been made possible, stable, and malleable by the wisdom of an intelligent creator. The mountains for instance attest to this intelligence. The Qur'ān refers specifically to the benefits conferred by mountains; it indicates how they serve as reservoirs, and consequently how they are a source of life both for man and for those lower creatures on which man depends.

61. Or, Who made the earth a resting place, and made in it rivers, and raised on it mountains and placed between the two seas a barrier. Is there a god with Allah? Nay! most of them do not know!

(27:61)

15. He it is Who made the earth smooth for you, therefore go about in the spacious sides thereof, and eat of His sustenance, and to Him is the return after death.

(67:15)

30. And the earth, He expanded it after that.

31. He brought forth from it its water and its pasturage.

32. And the mountains, He made them firm,

33. A provision for you and for your cattle.

(79:30-33)

The Qur'ān has further notions about the function of the mountains. One theory suggests that mountains have a stabilising role to play as if they formed a weight or peg which holds in position the rest of the land. Similarly, the land is sometimes spoken of as a spacious carpet with the mountains as the steadying agent which prevents the carpet from rolling or shaking about.

15. And He has cast great mountains in the earth lest it might be convulsed with you, and rivers and roads that you may go aright,

(16:15)

48. And the earth, We have made it a wide extent; how well have We then spread (it) out.

(51:48)

19. And Allah has made for you the earth a wide expanse,

20. That you may go along therein in wide paths.

(71:19-20)

6. Have We not made the earth an even expanse?

7. And the mountains as projections (thereon)?

(78:6-7)

19. And the mountains, how they are firmly fixed,

20. And the earth, how it is made a vast expanse?

(88:19-20)

10. He created the heavens without pillars as you see them, and put mountains upon the earth lest it might convulse with you, and He spread in it animals of every kind; and We sent down water from the cloud, then caused to grow therein (vegetation) of every noble kind.

(31:10)

In general the thesis is that existence on earth has been made comfortable by the workings of God and His divine mercy and omniscience. He provides the stable world on which man plays out his life.

Yet, we must not forget, temporary stability notwithstanding, that this world is in some ways merely a sign for that which is higher. The divine forms demand not the eternity of worldly forms, but on the contrary their ultimate dissolution. Thus, great mountains, in spite of their apparent permanence will, like the clouds, pass away.



88. And you see the mountains, you think them to be solid, and they shall pass away as the passing away of the cloud-the handiwork of Allah Who has made every thing thoroughly; surely He is Aware of what you do.

(27:88)

For the end of the mountains will occur like that of everything else in this world, on the Day of Judgement, an event described in the most harrowing terms in the Qur'ān. Yet this apocalyptic change operates within the laws of eternal oneness: the eternal reality subsists beneath the vicissitudes of temporal existence, and man would do well to heed the delicate nature of his existence within the mighty plan.

Yet the great scheme is a beneficent one, and every experience, however seemingly trivial, has its meaning. The Qur'ān, for instance, mentions the experience of altitude sickness which afflicts man if he ascends mountains beyond the point at which the air contains sufficient oxygen to sustain him.

125. Therefore (for) whomsoever Allah intends that He would guide him aright, He expands his breast for Islam, and (for) whomsoever He intends that He should cause him to err, He makes his breast strait and narrow as though he were ascending upwards; thus does Allah lay uncleanness on those who do not believe.

(6: 125)

In general, man is made free of the resources of the earth made available to him, which he exploits by the application of his intelligence and ability, which in turn have been provided by God.

44. Nay, We gave provision to these and their fathers until life was prolonged to them. Do they not then see that We are visiting the land, curtailing it of its sides? Shall they then prevail?

(21:44)

13. And He has made subservient to you whatsoever is in the heavens and whatsoever is in the earth, all, from Himself; most surely there are signs in this for a people who reflect.

(45:13)

20. Do you not see that Allah has made what is in the heavens and what is in the earth subservient to you, and made complete to you His favours outwardly and inwardly? And among men is he who disputes in respect of Allah though having no knowledge nor guidance, nor a book giving light.

(31:20)

65. Do you not see that Allah has made subservient to you whatsoever is in the earth and the ships running in the sea by His command? And He withholds the heaven from falling on the earth except with His permission; most surely Allah is Compassionate, Merciful to men.

(22:65)

44. The seven heavens declare His glory and the earth (too), and those who are in them; and there is not a single thing but glorifies Him with His praise, but you do not understand their glorification; surely He is Forbearing, Forgiving.

(17:44)

5. His is the kingdom of the heavens and the earth; and to Allah are (all) affairs returned.

(57:5)

93. There is no one in the heavens and the earth but will come to the Beneficent God as a servant.

(19:93)

Man's relationship with the world then is one of meaning: the world has been created for his use; he should make the most of the rich bounty which it is capable of providing; he should deploy its resources in accordance with the highest level of natural law and this capability of highest level is limited only by an intelligence as divinely endowed as the world on which it operates. This modest limitation is tempered only by the responsibility which is its correlative: Man is not the owner of the world that he enjoys; this sovereignty remains with the Creator, and man must respect the creation accordingly.

### **1.5.2. MINERALOGY**

Just as geology is described in the Qur'ān, so too is mineralogy, although it is not yet distinct from alchemy, chemistry, metallurgy and medicine. The precise nature of the relation between Qur'anic thought and modern science is in this case one of inspired encouragement rather than one of strict scientific content, for one is invited to wonder at the diversity and unity of the forms, textures and colours found within the rocks of the earth.

27. Do you not see that Allah sends down water from the cloud, then We bring forth therewith fruits of various colours; and in the mountains are streaks, white and red, of various hues and (others) intensely black?

(35:27)

25. Certainly We sent Our apostles with clear arguments, and sent down with them the Book and the balance that men may conduct themselves with equity; and We have made the iron, wherein is great violence and advantages to men, and that Allah may know who helps Him and His apostles in the secret; surely Allah is Strong, Mighty.

(57:25)

Despite the lack of a specific scientific thesis in the field of mineralogy, there is an underlying philosophical thesis at work. The idea centres around the notion of the unity and oneness of creation, and the connections which it makes take us swiftly from ontology to moral philosophy. They do so in the following way. The central precept of Islam is that the One Law of the universe is the Law of the One God. The entirety of creation is the manifestation of this identity. It follows from this that the world is under the sovereignty of the Creator; that the precious materials of the world are a gift from Him, for which we should be grateful. It is not the place of man, then, to hoard those riches for his own use rather than for beneficent and public use.

And there are those who bury gold and silver and spend it not in the Way of God; announce to them a most grievous penalty

(9:34)

Similarly, those who disbelieve cannot ransom themselves with any quantity of precious metals. They may offer all of their riches, but,

Theirs will be a painful doom and they will have no helpers

(3:91)

The law of God, then, is at once both moral and scientific. The laws of the universe are ones by which man grasps and manipulates his environment, but he does so with respect to a purpose, and that purpose is directed towards the betterment of the human condition. Even the physical world itself is replete with the signs of His purpose, and the activity of scientific endeavour is co-extensive with the discovery of His will. Thus, the incentive of the believer is to participate in the truth of the Kingdom of God. The researcher is the interpreter of the signs placed in this world by the wisdom and beneficence of the Creator

### **1.5.3. BOTANY**

Again, in botany the investigator finds a world rich in the signs of God. Consider the following passage as an indication of His munificence:

And among his signs is this: you see the earth barren and desolate; but when We send down rain to it, it is stirred to life and yields increase

(4:39)

From the standpoint of western philosophy, there is a clear conflict here between the following two propositions:

1. the world contains signs of his existence:
2. given His existence, the world contains signs of His benevolence.

And one might say that the confusion and ambiguity in the notion of a "sign" with respect to these two propositions allows an invalid transition from (2) to (1), that is, one infers his existence from his assumed existence-hardly a triumph of logic.

On the other hand, this criticism comes from a tradition which adopts its own invalidated assumption. That assumption is the axiomatic adoption of the schism between physical reality and ethical prescription, an assumption we can adopt with confidence only if we already know that the nature of the world is not in essence moral by its very nature, or not created by a moral being. The Qur'ān is, one could say, a working out of the idea of a world created by this moral being. It is in this context that one should understand statements such as the following:

It is He Who sends down the rain from the sky; from it you drink, and out of it grows the vegetation on which you feed your cattle. With it He produces for you corn, olives, date-palms, grapes, and every kind of fruit. Verily in this is a Sign for those who reflect .

(16: 10-11)

Of course, the existence of the Creator is not only suggested by the benevolence which appears in nature as mentioned in the Qur'ān, but also in its intelligence: there is an implicit argument from design. Thus, the vegetable kingdom, for instance, manifests an intricate and subtle balance and ecology: the diversity of crops, fruits, flowers and forests is contained within the strict order and deep structural unity indicative of the intellect of a wise creator.

19 And the earth-We have spread it forth and made in it firm mountains and caused to grow in it of every suitable thing.

(15:19)

49. Surely We have created everything according to a measure.

(54:49)

The examples in the Qur'ān concerning the reproduction of plants mostly serve to strike wonder and awe into mankind, and thereby indirectly draw attention to, and present evidence for, the Grandeur and Majesty of the Creator. For this purpose the Qur'ān finds it sufficient to concentrate its attention on sexual reproduction and so neglect here the asexual side of creation. Consequently, the Qur'ān focuses upon the cases of reproduction which can be attributed to the fusion of pairs, and this theme is developed in the following quotations:

53. Who made the earth for you an expanse and made for you therein paths and sent down water from the cloud; then thereby We have brought forth many species of various herbs.

(20:53)

10. He created the heavens without pillars as you see them, and put mountains upon the earth lest it might convulse with you, and He spread in it animals of every kind; and We sent down water from the cloud, then caused to grow therein (vegetation) of every noble kind.

(31:10)

5. O people! if you are in doubt about the raising, then surely We created you from dust, then from a small seed, then from a clot, then from a lump of flesh, complete in make and incomplete, that We may make clear to you; and We cause what We please to stay in the wombs till an appointed time, then We bring you forth as babies, then that you may attain your maturity; and of you is he who is caused to die, and of you is he who is brought back to the worst part of life, so that after having knowledge he does not know anything; and you see the

earth sterile land, but when We send down on it the water, it stirs and swells and brings forth of every kind a beautiful herbage.

(22:5)

3. And He it is Who spread the earth and made in it firm mountains and rivers, and of all fruits He has made in it two kinds; He makes the night cover the day; most surely there are signs in this for a people who reflect.

(13:3)

7. Do they not see the earth, how many of every noble kind We have caused to grow in it?

Most surely there is a sign in that, but most of them will not believe.

(26:7-8)

The culmination of the reproduction of plants is for the Qur'ān the germination of seeds. This is considered to be the greatest wonder, and at the same time a reason to invoke the ultimate cause—God.

"God causes the seed grain and the fruit-stone to split and sprout"

(6:95)

For the Muslim faith the important point here is the positioning of God as the sustaining unity behind the manifold diversity of plant life, directed by a single design and ultimate oneness. The reason to marvel rests in the synthesis of opposites, a reason common to science and theology.



#### 1.5.4.A. ZOOLOGY

Similarly, in the study of animal life, an appeal is made to jar the complacent from their low state of awareness and to make them participate in the divine through an appreciation of nature. Beginning with the notion that the animal kingdom is a rich domain of bounties for the benefit of mankind (thus again conjoining the moral and ontological parts of the thesis) we find attention drawn to a central unifying factor in the origin of life—water.

We made from water every living thing. Will ye not then believe?

(21:30)

Water as unity is combined with the richness of species as diversity:

And God has created every animal from water: of which there are some that creep on their bellies; some that walk on two legs; some that walk on four. God creates what He pleases; for verily God has Power over all things

(24:45)

The epistemology, if it may be so called, of the Qur'ān constantly refers to the synthesis which occurs as knowledge attains a higher unity out of its disparate elements. This theme is reflected by a focus on sexual reproduction: for here we have both a concrete example of fusion from dual elements and moreover a sign for the nature of reality, that is, unity lying behind plurality.

The theme of sexual reproduction as a sign for the fecundity and totality of nature finds many echoes in the Qur'ān.

That he did create in pairs male and female, from a small quantity of liquid when it is poured out.

(53: 45-46)

And he creates for you many other things, of which you have no knowledge at all. God has taken upon Himself to show the Right Way but there exist crooked ways too.

(16: 5-9)

The themes of compassion, intelligence, and the world as a system of signals, are not necessarily individuated in the Qur'ān. Again, one may have to resist the Western temptation to compartmentalise issues which, to one trained in the analytic tradition, automatically occur and assert themselves. The world as embodied consciousness, the world as a moral being, is the world of Qur'ān. And the belief in the existence of this world requires the acceptance of its premise, just as the view of western science requires the acceptance of the opposite premise: that the world consists of brute matter organised within a mathematical yet non-conscious nexus. The Qur'anic world is rich in mythological significance: it at once conveys the goodness of the creator and the eloquence of his opus, that is, the world itself.

As regards Signs, look around, there is not an animal (that lives) on the earth, nor a being that flies on its wings, but (forms part of) communities like you. (You will see that) We have left out nothing in predetermining the courses of their lives; then to their Lord they will be gathered

(6:38)

And behold! Your Lord has inspired the bee with this; 'Build your hives in the mountains, trees and in what man builds; then drink nectar from every kind of fruit, and follow the ways made by your Lord,' From its belly comes out a fluid of different colours wherein is healing for mankind. Verily this is a sign for those who reflect.

(16: 68-69)

God, it is maintained, both created the world in time and holds the world permanently in its order. This is for instance the view of bird-life: How are they held in the sky?

No one can hold them up except God. There are many signs for those who believe.

(16:79)

Do they not observe the birds above them, spreading their wings and folding them in. No one can uphold them except (God) Most Gracious. Truly it is He that watches over all things.

(67:19)

The process of transformation of animal fodder into the living animal, together with its milk, is according to the Qur'ān a miracle of wisdom operating under the ordinance of the Divine.

To the most wonderful process of the formation of pure milk in the bellies of she-cattle, for the fodder they eat blood, filth and pure milk, which is altogether different from the first in its nature, colour and usefulness.

(16:66)

#### **1.5.4.B. CREATION OF MAN**

The transformation theme is developed with reference to the creation of man: not only are we invited to consider the development of a human being from radically different raw materials (just as one marvels at the process of transforming animal fodder into milk etc.) but the process of reproduction through sexual means, thus reinforcing the theme of unity in diversity, is also emphasised.

It is he Who has created you in diverse stages.

(71: 14)

O Man! What has seduced you from your Lord Most inefficient.

It is He Who created and fashioned you in due proportion and gave you a balanced form

(82:6-7)

Many passages in the Qur'ān refer to both aspects of human reproduction, that is the formation of the human from organic material, and the process of sexual reproduction. The advanced condition of some of the knowledge cited in the Qur'ān favours an interpretation of divine revelation, for the detail seems to be beyond what was known at the time by ordinary means. As one can see in the following excerpts, the Qur'ān refers to the various stages of man's growth in the womb, to the fact that fertilisation occurs as a result of a small quantity of invisible liquid, that this liquid lodges in the female, and that the embryo passes through certain stages. Muslims contend that Muhammad was given this knowledge by God himself.

13. Then We made him a small seed in a firm resting-place,

14. Then We made the seed a clot, then We made the clot a lump of flesh, then We made (in) the lump of flesh bones, then We clothed the bones with flesh, then We caused it to grow into another creation, so blessed be Allah, the best of the creators.

(23: 13-14)

37. Was he not a small seed in the seminal elements,

38. Then he was a clot of blood, so He created (him) then made (him) perfect.

39. Then He made of him two kinds, the male and the female.

40. Is not He able to give life to the dead?

(75:37-40)

2. Surely We have created man from a small life-germ uniting (itself): We mean to try him, so We have made him hearing, seeing.

(76: 2)

8. Then He made his progeny of an extract, of water held in light estimation.

9. Then He made him complete and breathed into him of His spirit, and made for you the ears and the eyes and the hearts; little is it that you give thanks.

(32: 8-9)

20. Did We not create you from contemptible water?

21. Then We placed it in a secure resting-place,

22. Till an appointed term,

23. So We proportion it-how well are We at proportioning (things).

(77: 20-23)

5. O people! if you are in doubt about the raising, then surely We created you from dust, then from a small seed, then from a clot, then from a lump of flesh, complete in make and incomplete, that We may make clear to you; and We cause what We please to stay in the wombs till an appointed time, then We bring you forth as babies, then that you may attain your maturity; and of you is he who is caused to die, and of you is he who is brought back to the worst part of life, so that after having knowledge he does not know anything; and you see the earth sterile land, but when We send down on it the water, it stirs and swells and brings forth of every kind a beautiful herbage.

(22: 5)

2. He created man from a clot.

(96: 2)

The questions which arise concerning the marvels of human development are for the Muslim an indication of a creativeness only attributable to an intelligent creator.

### **1.5.5. AGRICULTURE**

The Qur'ān, as we have seen, is a text which combines ethical and factual matters. This unity expresses itself particularly in agriculture, where the welfare of mankind and physical science are intimately conjoined.

The teachings of Muhammad encourage the application of agricultural technology. It is the wish of God that the virtue inherent in the world bears its fruit in the form of food and raw materials born from the fusion of the bounty of nature and the effort of man. That effort is both physical and intellectual. Muhammad was concerned in the practical maximisation of this fruit, and consequently he was concerned that agricultural land should be used. He said that if anyone

had land, he should cultivate it, or lend it to his brother, but he should not let it remain uncultivated. He also suggested that land which has no owner should be awarded to him who develops it, as he has the best right to it.

The Qur'ān contains references to vineyards and cornfields and how to increase their yield and quality. But perhaps most important is the advocacy given to human effort in the direction of agriculture, so that the human condition may be bettered.

The practical result of this attitude led to research from the very beginning of the Islamic era, and good results were obtained. Experiments in intensive cultivation were successful, and Muslims introduced new crops to all those lands they travelled to. They often changed the pattern of food production in these new regions.

261. The parable of those who spend their property in the way of Allah is as the parable of a grain growing seven ears (with) a hundred grains in every ear; and Allah multiplies for whom He pleases; and Allah is Ample-giving, Knowing

(2: 261)

99. And He it is Who sends down water from the cloud, then We bring forth with it buds of all (plants), then We bring forth from it green (foliage) from which We produce grain piled up (in the ear); and of the palm-tree, of the sheaths of it, come forth clusters (of dates) within reach, and gardens of grapes and olives and pomegranates, alike and unlike; behold the fruit of it when it yields the fruit and the ripening of it; most surely there are signs in this for a people who believe.

(6: 99)

9. And We send down from the cloud water abounding in good,  
then We cause to grow thereby gardens and the grain that is  
reaped,

(50: 9)

26. Then We cleave the earth, cleaving (it) asunder,  
27. Then We cause to grow therein the grain,

(80: 26-27)

10. He it is Who sends down water from the cloud for you; it  
gives drink, and by it (grow) the trees upon which you pasture.

11. He causes to grow for you thereby herbage, and the olives,  
and the palm trees, and the grapes, and of all the fruits; most  
surely there is a sign in this for a people who reflect.

(16: 10-11)



## 1.6 GEOGRAPHY AND THE HOLY QUR'ĀN

Geography is a science which concerns all things from the surface of the earth to the upper limits of the atmosphere. So, all things, including man and his environment, are contained in the study of geography.

The revelations to Muhammad concern not only the earth but also the entire universe. The Qur'ān constantly enjoins man to participate in scientific investigation, and to uncover the mysteries of nature and the forces which lie behind them.

109. And We have not sent before you but men from (among) the people of the towns, to whom We sent revelations. Have they not then travelled in the land and seen what was the end of those before them? And certainly the abode of the hereafter is best for those who guard (against evil); do you not then understand?

(12:109)

46. Have they not travelled in the land so that they should have hearts with which to understand, or ears with which to hear? For surely it is not the eyes that are blind, but blind are the hearts which are in the breasts.

(22:46)

There is much evidence that the Qur'ān has stimulated scientific research. For instance, in the incident of the Prophet Moses, a place is referred to as the junction of two seas where Moses expected to find the man of knowledge; this has led to the empirical quest for the geographical location in question. Further, the account of the companions who cut a tract through mountains in order to

create rock edifices (15:82) has similarly stimulated the search for its discovery.

82. And they hewed houses in the mountains in security.

(15:82)

The Qur'ān cites the benefits which mountains bring to man, particularly their ability to attract rainfall. The following passages from the Qur'ān combine scientific accuracy with an invitation to wonder at the deep creative forces which lie at the root of scientific phenomena.

81. And Allah has made for you of what He has created shelters, and He has given you in the mountains places of the heat and coats of mail to preserve you in your fighting; even thus does He complete His favour upon you, that haply you may submit.

(16:81)

43. Do you not see that Allah drives along the clouds, then gathers them together, then piles them up, so that you see the rain coming forth from their midst? And He sends down of the clouds that are (like) mountains wherein is hail, afflicting therewith whom He pleases and turning it away from whom He pleases; the flash of His lightning almost takes away the sight.

(24:43)

2. These are verses of the Book of Wisdom

(31:1)

2. These are verses of the Book of Wisdom

(79:33)

The following passages concern the benefits of rainfall and its necessity for the maintenance of life, vegetable, animal and human.

60. Nay, He Who created the heavens and the earth, and sent down for you water from the cloud; then We cause to grow thereby beautiful gardens; it is not possible for you that you should make the trees thereof to grow. Is there a god with Allah? Nay! they are people who deviate.

(27:60)

10. He it is Who sends down water from the cloud for you; it gives drink, and by it (grow) the trees upon which you pasture.

(16:10)

80. He Who has made for you the fire (to burn) from the green tree, so that with it you kindle (fire).

(36:80)

7. And the earth, We have made it plain and cast in it mountains and We have made to grow therein of all beautiful kinds,

8. To give sight and as a reminder to every servant who turns frequently (to Allah).

9. And We send down from the cloud water abounding in good, then We cause to grow thereby gardens and the grain that is reaped,

10. And the tall palm-trees having spadices closely set one above another,

11. A sustenance for the servants, and We give life thereby to a dead land; thus is the rising.

(50:7-11)

The concept of rainfall is followed logically by a consideration of the seas, in which the bounty of those waters is mentioned thus:

99. And He it is Who sends down water from the cloud, then We bring forth with it buds of all (plants), then We bring forth from it green (foliage) from which We produce grain piled up (in the ear); and of the palm-tree, of the sheaths of it, come forth clusters (of dates) within reach, and gardens of grapes and olives and pomegranates, alike and unlike; behold the fruit of it when it yields the fruit and the ripening of it; most surely there are signs in this for a people who believe.

(6:99)

14. And He it is Who has made the sea subservient that you may eat fresh flesh from it and bring forth from it ornaments which you wear, and you see the ships cleaving through it, and that you might seek of His bounty and that you may give thanks.

(16:14)

Lastly, man's endeavours on the seas lead necessarily to a consideration of navigation, and here it is proposed that the fixed stars are the beacons by which the sea-farer finds his way.

16. And landmarks; and by the stars they find the right way.

(16:16)

The Qur'ān describes the phases of the moon in relation to knowledge essential for the survival of man. It describes the necessary ordering of things in terms of natural and divine law; astronomical events are both reflections of the universe's order and signs for the guidance of those who fear God.

5. He it is Who made the sun a shining brightness and the moon a light, and ordained for it mansions that you might know the computation of years and the reckoning. Allah did not create it but with truth; He makes the signs manifest for a people who fear God.

6. Most surely in the variation of the night and the day, and what Allah has created in the heavens and the earth, there are signs for a people who guard (against evil).

(10:5-6)

36. Glory be to Him Who created pairs of all things, of what the earth grows, and of their kind and of what they do not know.

37. And a sign to them is the night: We draw forth from it the day, then lo! they are in the dark;

38. And the sun runs on to a term appointed for it; that is the ordinance of the Mighty, the Knowing.

39. And (as for) the moon, We have ordained for it stages till it becomes again as an old dry palm branch.

40. Neither is it allowable to the sun that it should overtake the moon, nor can the night outstrip the day; and all float on in a sphere.

(36:37-40)

In geography, the Qur'ān describes the phenomenon where the two types of water remain distinct. This is attributed to the wisdom of God.

53. And He it is Who has made two seas to flow freely, the one sweet that subdues thirst by its sweetness, and the other salt that burns by its saltiness; and between the two He has made a barrier and inviolable obstruction.

(25:53)

19..He has made the two seas to flow freely (so that) they meet together:

20. Between them is a barrier which they cannot pass.

21. Which then of the bounties of your Lord will you deny?

22. There come forth from them pearls, both large and small.

(55:19-22)

To all these instances of scientific investigation in the Qur'ān must be added the following discoveries attributable to research stemming from Qur'anic studies. It is a little known fact that the diameter of the earth and the distance of the earth from the moon was a discovery of Muslim scholars, and not as is often said. These and other facts of astronomy and geography were unknown to the more ancient societies.

Nor should it be forgotten that the practice of orientating worship towards Makkah was a great stimulus in the science of determining exact latitudes. As a result of this scientific determination, Muslim traders, between the seventh and ninth centuries, reached China, acquired Zanzibar and some of the coast of Africa, advanced into Russia, and in moving across Europe were halted only by the Atlantic.

Another fundamental tenet of the Qur'ān may be seen as the impulse towards the accumulation of scientific knowledge. The fact is that Muslims perceived themselves as the rightful inheritors of the world's harvest, and as such they had an impetus towards the maximisation of use of this knowledge. The works of God are a divine gift not to be squandered but on the contrary to be brought

to maximum fruition by the application of exploration and development.

165. And He it is Who has made you successors in the land and raised some of you above others by (various) grades, that He might try you by what He has given you; surely your Lord is quick to requite (evil), and He is most surely the Forgiving, the Merciful.

(6:165)

14. Then We made you successors in the land after them so that We may see how you act.

(10:14)

29. He it is Who created for you all that is in the earth, and He directed Himself to the heaven, so He made them complete seven heavens, and He knows all things.

(2:29)

The philosophy of science in the Qur'ān is of a specific kind: it enjoins the scientist to uncover the deep structure of the universe in terms of how it is manifested by the signs which the Creator has placed within the grasp of our senses. Thus, the theory is one which combines the notion of layered realism with its essential correlate, the essential unity of creation; for the process of investigation is one of peeling away these layers systematically to attain ever higher and more unified levels of wisdom.

And of course it takes the further step of attributing the source of this unity to the all creative Deity, thus invoking a teleological aspect to the logical unity of reality posited by the world-view.

The following extracts demonstrate this view

164 Most surely in the creation of the heavens and the earth and the alternation of the night and the day, and the ships that run in the sea with that which profits men, and the water that Allah sends down from the cloud, then gives life with it to the earth after its death and spreads in it all (kinds of) animals, and the changing of the winds and the clouds made subservient between the heaven and the earth, there are signs for a people who understand.

(2:164)

190 Most surely in the creation of the heavens and the earth and the alternation of the night and the day there are signs for men who understand.

191 Those who remember Allah standing and sitting and lying on their sides and reflect on the creation of the heavens and the earth: Our Lord! Thou hast not created this in vain! Glory to Thee; save us then from the chastisement of the fire.

(3:190-191)

The central task of a believer then, is to make full use of the natural wealth that has been bestowed upon him by the Creator. Not for the Muslim is ascetic contemplation alone, but an active engagement with the works of nature (that is, of God) for the welfare of the human race. God has created a rich world, and he has equipped mankind with an intelligence capable of transforming the treasures of nature into the benefits of civilisation. Moreover, the world is rich in signs which point mankind towards his purpose.

3. And He it is Who spread the earth and made in it firm mountains and rivers, and of all fruits He has made in it two kinds; He makes the night cover the day; most surely there are signs in this for a people who reflect.

(13:3)



The following Muslim Geographers contributed to science of geography as a result of Qur'anic scholarship: al-Khwārizmī, al-Bīrūnī, al-Maḡdisī, al-Battānī, al-Ya'qūbī, al-Qudāmah, Ibn Rustah, Abū Zayd al-Balkhī, al-Istakhrī, Ibn Hawqal, Ibn Batūta, al-Hamadānī, Yāqūt Ibn Abdullāh al-Hamawī, and encyclopaedist al-Mas'ūdī.<sup>1</sup>

Early Muslims were active and involved in research, but later Muslims came to ignore the Qur'ān's promotion of science. Iqbal, the National Poet of Pakistan, says in one the volumes of his poetry, entitled *Zarb Kaleem*:

"whoever gets knowledge from the Qur'an is honoured in the world, and whoever begins to ignore its teaching becomes useless in the world'.

God especially addresses Muslims in the Qur'ān when He recommends the adoption of scientific method. Muslims, therefore, have a particular responsibility to carry out research, produce inventions and discover the universe, as directed in the Qur'ān:

20. Do you not see that Allah has made what is in the heavens and what is in the earth subservient to you, and made complete to you His favours outwardly and inwardly? And among men is he who disputes in respect of Allah though having no knowledge nor guidance, nor a book giving light.

(31, 20)

So, Muslims should investigate and discover what is in the sky and in the earth and use their facilities and this is not possible without the help of scientific knowledge, research and technological development.

## 1.7 PHYSICAL GEOGRAPHY

This section aims to draw attention to the factual scientific nature of the Qur'ān, especially with respect to physical geography. The depth and scope of Qur'anic geography is such that no exhaustive study can be undertaken here. What can be done however, is to relate some of the more suprising instances of geographical knowledge found in the Qur'ān, and thereby suggest some possible further avenues for research. As examples of Qur'ān and scientific investigation, rainfall, sedimentation and plant production will be studied.

One should remember in the following that physical science here must be understood in conjunction with a metaphysical thesis: physical matter is borne upon the structure of a conscious order, and the earth exists in relation to both the universe as a whole, and the heavens beyond.

In the Qur'ān, all things have a purpose and speak of the divine order. The heavenly bodies such as the sun and the moon move with purpose through the skies, just as the journeys of birds reflect their survival needs, and the growth of plants reflects their energy needs. In all things there is a teleology.

It is the following cycle of events which, according to the thesis, demonstrates the harmony of Divine Law.

1. Clouds cannot move without winds.
2. Precipitation cannot occur without evaporation.
3. Soil cannot flow without water.
4. Sedimentation cannot occur without water.
5. Plants cannot grow without rain.
6. Life cannot be sustained without water.

The following analysis will draw upon the Qur'anic understanding of the meaning of these interconnected events. Our investigations will support the idea of divine and natural identity.

## **1.8 THE PRESENT RESEARCH**

The research undertaken here considers the connection between certain assertions of the Qur'ān and the following aspects of geographical science: rainfall, sedimentation and plant production. Of course those aspects of geography should not be and cannot be treated in isolation from each other.

The water cycle is described in the Qur'ān. Types of soil distinguished by colour and texture are described, and finally the process of sedimentation is also described.

The Qur'ān can lay claim to documenting the basic facts of sedimentary processes. Certainly, it explains how rainfall erodes the soil, transports it and then deposits it. Moreover, it tells how the sediment is present in water in the form of foam as a suspended load and in the form of heavy material as a bed load. It tells, further, how the sediment is lost from the water by the process of sedimentation. Yet, the teleology is never lost sight of: the deposited material is rich, fertile soil which aids the growth of crops.

Throughout the Qur'ān there is a co-mingling of the moral and the scientific standpoint. And yet for the Western scientists who would insist on the segregation of these categories, there is much to satisfy him. The fact is that out of 6666 verses only 150 are about religious matters, and 750 verses are about the physical universe<sup>2</sup>. 50 verses describe rainfall, 7 sedimentation, 90 plant production. 25 verses which explain the idea of research appear in chapter 2, "The Qur'ān and Scientific Investigation". 11 verses which mention the principles of physical science appear in chapter 1, "Introduction".

**The constraints of space have necessitated a selective approach to the research investigating relations between the Qur'ān and science.**

## **1.9 OBJECTIVES OF THE STUDY**

This thesis is a comparative study of the Holy Qur'ān and physical geography.

The thesis has been divided into six chapters. The review of the literature related to each topic is covered in its relevant chapter. A brief description of each chapter is given below.

1. In the first chapter, "Introduction", I briefly introduce the research aims of my thesis. Firstly, I try to describe the importance of the topic. Secondly, each individual topic is outlined.
2. In the second chapter, "The Qur'ān and scientific investigation", I try to explain the importance of the links between Qur'anic thought and the growth of knowledge.
3. In the third chapter, "Rainfall", I briefly develop the link between some Qur'anic verses and the rainfall cycle in geography. The rainfall cycle is clearly mentioned in the Holy Qur'ān (The Believers, 23:18), and again in (The Embellishment, 43:11).
4. In the fourth chapter, "Sedimentation", I refer to specific research and experiments, and try to forge connections between them and passages in the Qur'ān, particularly 13: 4 and 17.
5. In the fifth chapter, "Plant Production", I explain that man's ability to control weather, rainfall and the fertility of land is limited. It is contended then that crops are dependent on the will of God, as God Himself says, "I am the only one who grows the crops, not

you".(56: 63-65). The themes of sexual reproduction and the role of the wind in the fertilisation and dispersal of seeds are here developed.

6. In the sixth chapter, "Conclusion and Proposals", a general conclusion is drawn and further proposals are suggested.

Geographical facts thought to be new to science can be shown to be represented in the Holy Qur'ān. The object of this thesis is to examine certain aspects of this representation.

## 1.10 CONCLUSION

In the last three centuries, especially in the present century, scientific research has unfolded the reality of the working of the entire universe, ranging from the development and functions of our own bodies to the environment we live in. Compared to today's knowledge, there was nothing but ignorance fourteen centuries ago. However, in the midst of this ignorance, the Qur'ān pointed out many of these facts. It described these natural phenomena in and to focus man's attention on the wisdom, benevolence and authority of his Creator. The more modern science unfolds the reality of these phenomena, the more the truth of the Qur'ān becomes evident to us. At a time when even the names of different fields of science did not exist, such precise knowledge could not come from any source but from the knowledge and wisdom of Allāh, the Highest. In the following pages, I shall bring forth some of these facts, scattered through the verses of the Qur'ān, for the benefit of Muslims and non-Muslims alike. These verses of the Qur'ān not only proclaim the truth of the Book but also beautifully demonstrate that attribute of Allāh, the Blessed, which is the source of sustenance for everything in the universe.

Here, I would like clearly to state my position in that I do not attempt to change the meaning of the Qur'anic verses to bring these in line with scientific discoveries, nor do I regard this scientific interpretation of the Qur'ān as final, because scientific knowledge itself constantly changes and evolves. Science has very little in it which can be called final and absolute. On the other hand, the word of the Creator of the universe is the final truth. With these words of



caution, however, I feel there are two important reasons to study the Qur'ān in the light of modern science:

1. The Qur'ān is a source of knowledge which is multidimensional and comprehensive. Since the development of science is considered the pinnacle of our times, I try to correlate Qur'anic studies with man's own scientific discoveries and experiments; this kind of rational thinking contributes to a better understanding of the Qur'anic verses.
2. The biological and physical facts of the universe as described by the Qur'ān could not be known by ordinary means before the modern technological break-through. If the descriptions of the Qur'ān are proven beyond any reasonable doubt, then an unbiased person should not have any hesitation in accepting the teachings of the Qur'ān, especially if the clarity, simplicity and practical application of these teachings proves superior to anything existing in the world.

These reasons necessitate the study of the Qur'ān in the light of science, of course keeping in mind the factors of probability and differing interpretations of scientific observations. Such differences are similar to the differences which arise in the application of logic, grammar and other linguistic criteria.

## 1.11 REFERENCES

1. Hitti, Philip, K., History of the Arabs, Karachi, 1970, 392.
2. Khan, A. A., Islam and Science, Lahore, 1984, 110.

CHAPTER NO: 2  
THE HOLY QUR'AN AND SCIENTIFIC INVESTIGATION

**2.164**

Behold! 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 God 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 a people that are wise.

Ali, A. Yousuf

## **2.1 INTRODUCTION**

The Qur'ān is full of directions to think, observe and discover the laws of the universe. Early Muslims then, tried to acquire more knowledge and to increase their understanding of the world.

## **2.2 THE QUR'ANIC VERSES WHICH HAVE INSPIRED SCIENTIFIC INVESTIGATION**

1. 164 Behold! 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 God 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 a people that are wise.

(2:164)

2. 96 He it is that cleaveth the day-break (from the dark): He makes the night for rest and tranquillity, and the sun and moon for the reckoning (of time): Such is the judgement and ordering of (Him), the Exalted in Power, the Omniscient.

3. 97 It is He Who maketh the stars (as beacons) for you, that ye may guide yourselves, with their help, through the dark spaces of land and sea: We detail Our signs for people who know.

(6:96-97)

4. 5 It is He Who made the sun to be a shining glory and the moon to be a light (of beauty), and measured out stages for her; that ye might know the number of years and the count (of time). Nowise did God create this but in truth and righteousness. (Thus) doth He explain His Signs in detail, for those who understand.

(10:5)

5. God is He Who raised the heavens without any pillars that ye can see; is firmly established on the throne (of authority); He has subjected the sun and the moon (to his Law)! Each one runs (its course) for a term appointed. He doth regulate all affairs, explaining the signs in detail, that ye may believe with certainty in the meeting with your Lord.

6. 3 And it is He who spread out the earth, and set thereon mountains standing firm and (flowing) rivers: and fruit of every kind He made in pairs, two and two: He draweth the night as a veil o'er the Day. Behold, verily in these things there are signs for those who consider!
  
7. 4..And in the earth there are tracts side by side and gardens of grapes and corn and palm trees having one root and (others) having distinct roots-they are watered with one water, and We make some of them excel others in fruit; most surely there are signs in this for a people who understand.  

(3: 2-4)
  
8. 22.And one of His signs is the creation of the heavens and the earth and the diversity of your tongues and colours, most surely there are signs in this for the learned.
  
9. 24. And one of His signs is that He shows you the lightning for fear and for hope, and sends down water from the clouds then gives life therewith to the earth after its death; most surely there are signs in this for a people who understand  

(30:22, 24)
  
10. 3. Most surely in the heavens and the earth there are signs for the believers.
  
11. 4. And in your (own) creation and in what He spreads abroad of animals there are signs for a people that are sure;
  
12. 5. And (in) the variation of the night and the day, and (in) what Allah sends down of sustenance from the cloud, then gives life thereby to the earth after its death, and (in) the changing of the winds, there are signs for a people who understand.

- 13 12. Allah is He Who made subservient to you the sea that the ships may run there in by His command, and that you may seek of His grace, and that you may give thanks.
- 14 13. And He has made subservient to you whatsoever is in the heavens and whatsoever is in the earth, all, from Himself; most surely there are signs in this for a people who reflect.

(45:3-5, 12-13)

In these verses God addressed men of knowledge and told them to think about the Qur'anic verses and observe the universe so that they might investigate it.



### **2.3 THE QUR'ĀN AND SCIENTIFIC THOUGHT**

It has been confirmed by experience that physical processes follow their course in a specific manner. For instance, it is axiomatic that an object left in the air comes down to the earth. The rays of light falling on a mirror are reflected back. A magnetic needle suspended freely points towards the north and south. The sun, the moon and the stars revolve at a certain speed within their specific orbits. No such physical processes assume their course of action accidentally, but are governed by certain physical laws. An object in the air falls to the earth as a natural result of the law of gravity. The study of these physical laws and processes is the main concern of physical science.

Beside the physical laws, there are also other laws, the Islamic laws which are designed to govern the conduct of man according to the will of Allāh. In a sense they are not like physical laws, since they are not implemented under compulsion, but are left to human volition. When Allāh offered the entire system of these laws to the heavens, the earth and the mountains as a trust, they became overawed and expressed their inability to acquit themselves of this overburdening obligation. Man, however, accepted this great responsibility,<sup>3</sup> and thus indicated his complete submission to Allāh of his own free will.

Yet the laws of the Qur'ān are, in fact, the scientific laws of human nature. The Prophet of Islam (peace be upon him) says:

"Every child is born with an Islamic disposition. Then his parents make him a Jew, a Christian or a Magian".<sup>4</sup>

The Prophet thus indicated that man is influenced by his environment, which may lead to his deviation from the tendencies of his nature and the right path of Islam. We can thus postulate that it is the natural urge of man to worship the supreme Authority in the universe, responsible for his gain and loss. But some human beings under the influence of their environment, instead of worshipping Allāh, submit to the authority of other beings whom they consider so responsible. Likewise, man by nature loves noble values like truth and mercy, and hates the bad qualities of human character such as falsehood and cruelty. But sometimes a man adopts bad qualities under the influence of his environment. The prophets were sent by Allāh to human beings in order to convey to them the Qur'anic laws. Thus, unlike physical laws, the Qur'anic laws are not discovered by experience, but were revealed to the prophets by Allāh.

Whatever can be known through experience was not included in the teachings of the prophets. Anything of this category, mentioned in their teachings, is meant to describe some attribute of Allāh. The following verse of the Holy Qur'ān illustrates the point:

“Glorious is He who created all pairs among those which the earth produces and among themselves and among those which they know not”.

(36: 36)

The Prophet of Islam did not show his concern as a prophet with the things which can be known through experience, i.e. through scientific processes. He explained his mission in these words:

"I have been sent only to perfect the qualities of moral excellence",<sup>5</sup>

"I have been sent only as an educator".<sup>6</sup>

Man was appointed as the vicegerent, i.e. the executor of Allāh's revealed laws on the earth.<sup>7</sup> On the one hand, man is blessed with faculties of mind which enable him to discover physical laws, and thus to harness everything in the universe to his best advantage. References to this fact have been made in several Qur'anic verses, for example:

See ye not how Allah hath made subservient (serviceable) unto you whatsoever is in the heavens and whatsoever is in the earth, and showered on you His blessings both manifest and hidden.

(3:20)

On the other hand, man was tested as to whether or not he would lead his life and utilise the natural resources at his disposal according to the Qur'anic laws.

The declaration of the Creator of the universe that everything has been made subservient to man provides a great incentive for the exploitation of all the resources for the welfare of mankind. The Prophet of Islam has declared that the acquisition of knowledge is compulsory for all Muslims.<sup>8</sup> The Qur'ān has provided some clear instructions to believers, which form the starting point of serious activities in the field of scientific studies and research. Allāh commanded Muslims to travel throughout the world in order to see the nature of the consequences for the rejecters "of the natural laws of the Qur'ān".<sup>9</sup> Another divine command imposes a permanent

obligation upon Muslims to prepare the maximum possible force and war material to frighten their enemies as well as enemies of Allāh and others unknown to them but known to Allāh.<sup>10</sup> This is one of the most important incentives for the accumulation of power, the organisation and development of war industries and the invention of new weapons and equipment.

The frequent references to the natural phenomena of the universe in the Qur'anic verses, the different stages of the moon,<sup>11</sup> the creation of everything according to specific proportions,<sup>12</sup> the revolution of the sun and the moon at a certain speed and according to a system,<sup>13</sup> and the creation of everything in pairs,<sup>14</sup> are by implication incentives for scientific investigation.

Scientific knowledge is based on two important factors: observation (or experiments which are also observations made under artificially created conditions) and reflection. The former involves the use of physical senses whilst the latter is concerned primarily with the intellect. In the Qur'ān emphasis is laid on the need for observation of physical phenomena and natural processes, and subsequent reflection on whatever has been observed. Man should observe whatever is (visible) in the heavens and the earth.<sup>15</sup> He should look into the processes of the growth of food grains,<sup>16</sup> the flight of birds during which they expand and contract their wings,<sup>17</sup> and so on.

In order to discover a fact reflecting over whatever has been observed is essential. The significance of reflection has been stressed in the Qur'ān. A number of physical processes mentioned frequently in the Qur'anic verses have been characterised as signs

of Allāh for those who reflect, e.g., "why do they not ponder"?<sup>18</sup> "In them there are signs for those who reflect".<sup>19</sup>

Those who do not use their senses for observation and their minds for reflection have been compared to cattle, and they have been described as even more astray than they.<sup>20</sup>

Sometimes observations and reflection are not conducive to a definite conclusion without the application of reason. A number of facts have been explained in the Qur'ān through reasoning, and various methods of reasoning have been adopted.

The following verse is an illustration of one of the Qur'anic ways of reasoning:

"Had there been many gods in them [the heavens and the earth], beside Allah, they would have been in disorder".<sup>21</sup>

The reasoning employed in the above mentioned verse is designed to focus attention on the oneness of, by arguing that had there 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 Allāh.

The following Qur'anic verse provides an example of the analogical method of reasoning:

"Allah it is who sendeth the winds and they raise a cloud, then lead into a dead land and revive therewith the earth after its death. Such is the Resurrection".

(35: 9)

In this verse an inference is to be drawn from the revival of dead land, that Allāh will resurrect the dead human beings on the Day of Judgement.

The deductive method of reasoning can be employed in the following verse : " Allāh is the creator of everything".<sup>22</sup> It can be deduced from this verse that human beings, animals and plants are creatures of Allāh. The Qur'ān has also described the names of many things created by Allāh.

The inductive method used in the Qur'ān is equally lucid and forceful as shown in the following verse:

"Say: O Allah, owner of sovereignty! Thou givest sovereignty unto whom Thou wilt, and Thou withdrawest sovereignty from whom Thou wilt, Thou exaltest whom Thou wilt, and Thou abasest whom Thou wilt. In thy hand is the good. Lo! Thou art able to do all things".

(3: 26)

This verse leads to the conclusion that Allāh is omnipotent by virtue of His command over kingdoms which He may confer on anyone and may seize from anyone, and His ability to honour or disgrace anyone.

Observation of Allāh's creation and reflection upon it may lead a person to believe in the existence of Allāh, His Oneness, infinitesimal Might, Glory and other Attributes. Anyone who observes the existence of an integral order in this universe by discovering the specific laws governing it, such as the laws of chemical combination, the laws of observation and reflection, the

existence of all substances in a definite proportion which remains constant through natural processes, such as the proportion of nitrogen and oxygen in the atmosphere, may ultimately believe that there is certainly a creator, designer, planner and administrator of this universe.

It is evident, therefore, that the study of the physical phenomena can be conducive to man's belief in Allāh and His attributes. The story of the prophet Abraham in the Qur'ān contains his declaration made after observing the fading out of the stars, the moon and the sun: "I am free from all that ye associate (with Allāh)".<sup>23</sup> This shows that by observing the physical phenomena and reflecting on them the prophet Abraham was convinced of the existence of an eternal Deity, the Almighty Allāh, the Creator of the universe.

The following verses of the Holy Qur'ān indicate that those scientists who believe in Allāh, and ponder over the universe as His creation are blessed:

"Hast thou not seen that Allah causeth water to fall from the sky and we produce therewith fruit of diverse hues; and among the hills are streaks white and red, of diverse hues, and raven black and of men and beasts and cattle, in like manner, of diverse hues. The 'ulama' among His bondsmen are overawed by Allah alone. Lo! Allah is Mighty and Forgiving"

(35: 27)

In this verse the title of 'ulama' has been given to those men of learning who make such observations and ponder over the various aspects of Allāh's creation. They realise that every natural process involves certain physical laws, and there is a definite order and system in everything, for instance, in the atoms of the elements, the cells of living bodies, the petals of flowers, the waves of light and electricity, and the planets of the heavens. Those who have the knowledge of such facts are so much impressed by the Glory and Might of Allāh that they begin to be overawed by Him. The statement at the end of the verse that Allāh is Mighty and Forgiving suggests that such 'ulama' will be blessed because their firm belief in Allāh and their ceaseless devotion and submission to Him will play an important role in setting their life on the path of righteousness.

Another verse says:

"Lo! in the creation of the heavens and the earth and (in) the difference of night and day are signs for men of wisdom such as remember Allah, standing, sitting and reclining, and consider the creation of the heavens and the earth. Our Lord! thou did not create this in vain"

(3: 190-191)

This verse indicates that those who always remember Allāh, and follow the Qur'anic laws and injunction and ponder over His creation are men of wisdom, and it is such people who come to a correct conclusion about the universe. They begin to realise that the universe has not been created in vain, and that it has certain functions and objects. Thus such people have a correct concept of the universe, and, indeed, it is a person's conception of the universe which influences his or her life.



## 2.4 THE QUR'ĀN AND INITIAL WORK OF SCIENCE

Early Muslims looked to the Qur'ān for advice concerning how to observe, think about and discover the laws of the universe. They followed this advice in order to develop their understanding of the importance of education, to invent new things, and to find new ways to investigate the universe.

From the early days of Islam, Muslims of all countries in general, and those of Arabia in particular, travelled extensively through plains and hills, rivers and oceans, forests and deserts in connection with Jihād, Hajj, trade, etc. In the course of their travels they collected information on social, political, historical, geographical, economical, agricultural and other conditions of the lands they visited. As a consequence of the collection of such information, sciences such as history and geography were developed.

So far as the physical or experimental sciences are concerned, the pre-Islamic Arabs inevitably had some basic knowledge of them. They accumulated information on animals like horses, camels and sheep, and on the plants of their homelands. They had some comprehension of the medicinal application of certain plants. The names mentioned in pre-Islamic Arabic literature of various internal and external organs of human and animal bodies suggest that their knowledge of anatomy was not unreasonable. The Arabs had some knowledge of astronomy and meteorology as well. They had some information on the fixed stars, the movements of the planets and the changes of weather. A number of arts such as horse-breeding and camel-rearing were also in existence.

Following the conquest of Egypt and some territories of the Byzantine Empire, the Muslims came across scientific institutions such as those of Jundishapur, Harran and Alexandria. The scientific and philosophical works of the Greeks found in these and other places aroused great curiosity.

Access to foreign scientific literature was thus ensured in many ways. The manuscripts in the territories which fell into the possession of Muslims were accessible without any difficulty. Thus after the conquest of Alexandria, Harran and other principal centres of Greek learning, the treasuries of books available there were within their reach.

Sometimes books were brought to Muslim lands by people belonging to non-Islamic lands. Sometimes the Caliphs sent their representatives to Byzantium, Armenia, Egypt, Syria, Cyprus and other places to collect scientific and philosophical writings. In some cases a very intensive search had to be made to find a particular work.

In order to make foreign scientific works more accessible, it was necessary to translate these works into Arabic. Such translations necessitated the development of new terminology, Arabic being a flexible and rich language, easily provided terminology for the new sciences.

A number of posts were established by the rulers at many places in the Muslim world to carry out the work of translation. These people undertook the translation of the main Greek works on philosophy,

astronomy, mathematics, geography, medicine and other sciences. The first such academy, named Bayt al Hikmah was set up by the Caliph al-Ma'mūn. This academy contained a library and an observatory. Another such institution was founded by the Fatimid rulers in Egypt. During the reign of the Caliph al-Mutawakkil, the translation school was refounded. Some other works of Greek scientists were translated into Arabic.<sup>24</sup>

The translations were often revised and improved by other scholars. Different versions of a work were collated, and compared to allow the provision of improved editions of a text. For instance, Hunayn ibn Ishaq collected Greek manuscripts and examined the existing Syriac and Arabic versions in order to prepare more authoritative Arabic translations.<sup>25</sup>

The translation work which began in the 8th century was, to a significant degree, done by the end of the 10th century. The translators belonged to different ethnic and religious groups. For instance, Nawbakht was of Persian origin; Muhammad Ibn Ibrāhīm al-Fazārī was an Arab. Hunayn Ibn Ishāq was a Nestorian Christian from al-Hīrah.<sup>26</sup>

The Muslim scientists would not accept authoritarianism in science. They would accept the scientific conclusions of others subject to their own experimental verification, and would also make new observations and experiments leading to new discoveries. The following quotation from Kitāb al-Tafhīm of al-Bīrūnī illustrates this point:

"And I have truly done what everyone is bound to do in respect of any particular science, that is, to accept gratefully the original contributions of his predecessors, to correct fearlessly the errors that come to his notice, and to leave it as a record for the future generations that are to follow him in time".<sup>27</sup>

Muslim scientists fused the practical approach to scientific problems with abstract intellect. Their highly developed scientific techniques, the labelled diagrams of their scientific apparatus, the elaborate discussions of chemical reactions found in their books, all serve to confirm this thesis.

The Muslims studied particular facts on the basis of experiments, and drew inferences in the form of general principles or scientific laws. In other words, the inductive method used to be employed. For instance, Ibn al-Haytham studied the course of rays of different types of light falling on different types of mirrors, at different angles of incidence, and then formulated the second law of reflection.<sup>28</sup>

Muslim scientists recognised the physical or qualitative and the mathematical or quantitative aspects of science.<sup>29</sup> They made qualitative as well as quantitative studies of numerous scientific problems. For instance, Ibn Khurdādhbeh determined the latitudes of various places in the Muslim world. Al-Bīrūnī ascertained the specific gravity of a number of substances.<sup>30</sup>

Experiments in chemistry, physics and medicine used to be performed in laboratories, and those in pathology and surgery in hospitals. Observatories were set up at various places in the Muslim

world, such as Damascus, Baghdad, Nishapur, and Rayy, for astronomical observations.

The Caliph al-Mu'tasim supplied a physician with apes for this purposes of dissection. Practical demonstrations of surgical operations for the students were given in hospitals.<sup>31</sup>

As observations which are carried out with inaccurate instruments do not lead to correct results, great attention was paid towards the accuracy of the instruments. The old instruments were improved, and new ones were invented. The instruments of those days were far better and more accurate than those of the Greeks and those manufactured in the famous Nuremburg factory in the fifteenth century.<sup>32</sup>

The makers of good instruments were highly esteemed. Among them were Hamīd and 'Alī Ibn 'Īsā who were compared by a famous astronomer, Ibn Yūnus, to Galileo and Ptolemy. This shows how much importance the Muslims attached to good instruments. On account of the desire for the utmost accuracy in observations and calculations, the valuable results used to be signed on oath in the presence of judges.

Scientific observations are sometimes tedious, and sometimes they require a long period of time, firstly, because they have to be repeated for verification and elimination of errors, if any, and, secondly, because sometimes the nature of observations is such that they cannot be completed before a certain minimum time. Therefore, detailed and long observations, patient investigation and

examination, the procurement of positive knowledge and curiosity for experimentation are all the pre-requisites of scientific research for which Muslim scientists were adequately oriented. To quote an example, Ibn al Baitar collected botanical specimens from the Muslim world, and compared the flora of India and Persia with those of Greece and Spain. His work, comprising of a description of 1400 plants, has been considered by Meyer to be a monument of industry.<sup>33</sup>

"Contrast that spirit of scientific minuteness and perseverance in observation with the speculative methods of the ancients who scorned mere empiricism; with Aristotle who wrote on physics without performing a single experiment, and on natural history without taking the trouble to ascertain the most easily verifiable facts, who calmly states that men have more teeth than women, while Galileo, the greatest classical authority on anatomy, informs us that the lower jaw consists of two bones, a statement which is accepted unchallenged till 'Abd al Latif takes the trouble to examine human skulls".<sup>34</sup>

An important factor in the promotion of learning in the Muslim world was the patronage of learning and the encouragement of scholars by the Caliphs, governors and government officials. Intellectual activity was heightened owing to the fact that the rulers and their high officials had tended themselves to be great scholars. A scholar would not normally have had access to them, unless he was well versed in science. The rulers used their authority for the progress of learning, and encouraged scholars from every part of the world, irrespective of religion, race and nationality. As a result of this encouragement and other factors, an unprecedented enthusiasm for learning was developed among Muslims. It became common to reckon a man's wealth not by his possession of material

resources, but by his acquisition of learned books. To establish amicable relations with the Caliphs, non-Muslim rulers would offer gifts of books. Government servants, governors, judges and others are said to have hurried to lecture theatres once free from their official duties. Whenever the caliphs travelled, they were accompanied by scholars to quench their thirst for knowledge. Literacy had reached the highest standard of the age among Muslim peoples.

The scientific spirit of that age is indicated for example by the work on optics of Shihāb al-Din al-Qirafi, a scholar of Islamic Law and judge of Cairo (1285 AC). This work deals with fifty optical problems, three of which concerned questions put to Muslim scholars by the king of the Franks in Sicily. These questions included:-

1. Why do oars and lances, partly covered with water, appear to be bent?
2. Why does Canopus appear bigger when near the horizon, whereas the absence of moisture in the southern deserts precludes moisture as an explanation?
3. What is the cause of the illusion of floating before the eyes of those suffering from incipient cataract and other eye troubles?<sup>35</sup>

The Muslim scientists not only made original contribution to science but also to technology. In other words, they made practical use of their scientific discoveries. They observed the stars, and

prepared star maps for navigational purposes. Ibn Yúnus made use of the pendulum for the measurement of time. Ibn Sina used an air thermometer to discover air temperature.<sup>36</sup>

Muslim scientists were to make algebra a permanent branch of mathematics. The word algebra, used throughout the languages of the world, is derived from the Arabic al-jabr. Muslim scientists also evolved plane and spherical trigonometry, and applied it to astronomy. By developing al-jabr to the solution of the fourth degree equations, and using sine and tangent instead of the chord of the Greeks, they made an enormous addition to the human power of investigation. Similarly, chemistry became more of an exact science. Optics and ophthalmology became highly advanced. By developing the medical treatment of animals, they made it a permanent branch of science, which was given the name of Baitarah after the name of its founder, Ibn al-Baitār. This word has been corrupted into 'veterinary' in English. They also separated astrology from astronomy, as a belief in the influence of stars on the fate of human beings was considered heresy in Islam. Astronomy was thus developed to the stage of a pure science after its separation from superstitious beliefs. Al-Rāzī applied chemical knowledge to the preparation of medicine. Thus, he became the founder of Iatrochemistry.<sup>37</sup> Muslim scientists developed other branches of science also to a high level, and continued to make many discoveries and inventions.

The works of these scholars were widely studied not only in the Muslim world but also in Europe, mostly through Latin translations, beginning in the 12th century.



The most important scholars, responsible for the spread of Muslim sciences among Europeans, were Constantine the African, Adelard of Bath, Petrus Alphonsi, Gerard of Cremona, Mark, Ramon Llull, Roger Bacon, Berengar of Valencia and Arnold of Villanova.<sup>38</sup>

The agencies through which such scientific knowledge passed from the Muslim world to Europe were thus:

1. Towns
2. Persons
3. Crusades
4. Medical schools

In 1085 Toledo, the greatest centre of Muslim learning in the West, fell into the possession of Spanish Christians. The students from different parts of the Europe were accustomed to studying Islamic sciences there. Archbishop Raymond founded an academy where the medical, philosophical, astronomical, astrological, and other works were translated. The translators and teachers were Muslims and Jews who knew Arabic, Hebrew, Spanish and Latin.

Sicily, which had been under Muslim control for 130 years, fell in 1091 into the possession of the Normans. There also Greek and Arabic texts were translated into Latin. The kings, from Roger 1 to Frederick 11, Manfred and Charles 1 of Anjou patronised learning, and thus Sicily proved to be a significant centre for the transmission of Muslim scientific knowledge to Europeans.<sup>39</sup>

The influence of the Crusades on the spread of Muslim sciences in Europe was visible in the foundation of hospitals based on a Muslim pattern throughout Europe in the 13th century.

Some scientific works of Muslims were thoroughly studied in western academic institutions, which consequently exerted a great influence on scientific development in Europe. Kitāb al Qānūn by Ibn Sīnā, Kitāb al Manāzīr by Ibn al Haitham and Kitāb al-Tasrīf by al-Zahrāwī can be cited as an example. Kitāb al Qānūn, which is a comprehensive medical work and is called Canon in the west, was translated into Hebrew in 1270. It was also translated into Latin by the two Gerards of Toledo, and about thirty editions of this work were published in Europe. Many commentaries on it were written in the 15th century. A beautiful Arabic addition of this work was published in Rome in 1593. It formed half the medical curriculum of the European universities in the later part of the 15th century, and continued as a text-book until about 1950 in the universities of Montpellier and Louvain. The translation of the first volume of the book into English, with the exception of the anatomical part, was made in 1930.<sup>40</sup>

Kitāb al Manāzīr (book of optics) was translated into Latin under the title Opticae Thesaurus Alhazeni. Ibn al-Haitham, the author of this book, was called Alhazen, a name by which he is remembered in Europe to this day. According to George Sarton, this book exerted a great influence on European scientists (from Roger Bacon to Kepler, i.e. for about 600 years).<sup>41</sup>

Kitāb al-Tasrīf is an encyclopaedic work comprising medicine and surgery. In the 12th century Kitāb al-Tasrīf was translated into Latin by Gerard of Cremona, and editions of it were published at Venice in 1497, and at Basel in 1541. It was published in 1778 at Oxford along-side the original Arabic text. A copy of this edition is in the British Museum, and one is in the Bodleian Library. An English translation was published in 1861, and a French translation first appeared in 1880. This masterpiece of al-Zāhrawī retained its importance for centuries as the manual of surgery at Salerno, Montpellier and other early schools of medicine in Europe. The great European historians admit that Europe owes her primary advancement in surgery to al-Zāhrawī. Dr. Joseph Heres has recognised Abū al-Qāsim al-Zāhrawī as an eminent surgeon. Dr. Arnold Campbell, in this book, Arabian Medicine, has a large treatise on al-Zāhrawī, which reveals the importance of this name in the west. He shows that western scholars like Roger Bacon (1214-49) gained knowledge of medicine and surgery from the books of al-Zāhrawī and Ibn Rushd.<sup>42</sup>

Thus the European nations who lived in uncivilised conditions beside the brilliant and creative Muslim civilisation, and were in constant touch with it, were influenced by it in consonance with the laws of nature, and the spirit of inquiry was born among them. The artistic and scientific heritage of Islam was transferred to Europe mainly through Sicily and Spain, and its results appeared in the form of the 1200 Renaissance.

Science is an organised and integral process in which every step forward is connected with the last. Every new generation acquires

the ability to advance only on the basis of the achievements of its predecessors. The same thing happened with the achievements of Muslim scientists as well. They, inspired by the teachings of Islam, played a basic role in the development of modern science and turned a pre scientific world into a scientific world.

The numerous Arabic words and scientific terms currently used in European languages are living monuments to the Muslims, contribution to modern sciences. Besides, the large number of books in the libraries of Asia and Europe, the scientific instruments preserved in the museums of many countries, the mosques and palaces built centuries ago also bear an eloquent testimony to this important phenomenon of world history.

## 2.5 CONCLUSION

From what has been discussed above, it is obvious that the spirit of enquiry nurtured by Muslims and the scientific method of the Qur'ān have inspired major contributions in the evolution of modern science. Dr. Robert Briffault states that science arose in Europe as a result of this new spirit of enquiry, of its new methods of investigation, of its method of experiment, observation, measurement, of the development of mathematics in a form unknown to the Greeks. That spirit and those methods were introduced into the European world by the Arabs/Muslims.<sup>43</sup>

The Qur'anic methodology was the genesis of Islamic science which, as we have seen, evinces the Unity of the Creation and the fusion of its disparate elements guided by the intellect and benevolence of the One God. No matter how hidden the path of knowledge may be, the Qur'anic scholar, inspired by his faith in the one Way, seeks out this direction through the morass of obscuring detail.

Thus, the symbiotic relation between science and faith constantly reinforces both: the Muslim becomes a better scientist, and the scientist becomes a better Muslim. And finally this duality is overcome, as the scientist/believer is no longer held captive by the false categories of analytic dissection. Qur'anic faith perceives the world as the one unity of God's creation, both through the intellect, and through the intuition.

## 2.6 REFERENCES

3. The Holy Qur'ān, 33: 72.
4. al-Bukhārī, Abū 'Abd Allāh Muhammad b Ismā'īl, Al Jāmi' al-Sahīh, Vol. I, Leiden, 1862, 8, 93.
5. Mālik b Anas, al-Muwatta, Karachi, 1972, 8.
6. Ibn Mājah, Sunan Ibn Mājah, Beirut, 1940, 17.
7. The Holy Qur'ān, 2: 30.
8. Ibn, Mājah op. cit., 17.
9. The Holy Qur'ān, 6: 11.
10. Ibid., 8: 60.
11. Ibid., 36: 39.
12. Ibid., 25: 2.
13. Ibid., 55: 5.
14. Ibid., 36: 36.
15. Ibid., 10: 101.
16. Ibid., 81: 24-32.
17. Ibid., 67: 19.
18. Ibid., 6: 50.
19. Ibid., 13: 4.
20. Ibid., 7: 179.

21. Ibid., 21: 22.
22. Ibid., 39: 62.
23. Ibid., 6: 7.
24. Sarton, George, Introduction to The History of Science, Vol. I, Washington, 1950, 611.
25. Ibid., 611.
26. Lewis, Bernard, (ed.), The World of Islam, London, 1976, 181.
27. Iran Society, al-Biruni, Calcutta, 1951, 1.
28. al-Fārisī, Kamāl al Dīn Abū' al-Hasan, Tanqīh al-Manāzīr, Vol. I, Hyderabad, 1347 A.H., 362.
29. Al-Khāzin Abū Ja'far, Mīzān al-Hikmah, Hyderabad, 1359 A.H., 6.
30. Briffault, Robert, The Making of Humanity, Lahore, 1980, 193.
- 31 Wāsītī, Hākīm Nayyār, Tibb al-'Arab, (Urdu translation of Arabian Medicine, by E.G. Browne), Lahore, 1954, 51.
32. Ibid., 51.
33. Briffault, op. cit., 193.
34. Ibid., 194.
35. Ibid., 198.
36. Ibid., 191.
37. Sarton, op. cit., 609.
38. Ibid., Vol. 11, 491-493.
39. Wasiti, op. cit., 385.
40. Ibid., 78-86.

41. Ibid., 721.

42. Ibid., 681.

43. Briffault, *op. cit.*, 191.



**CHAPTER NO: 3**  
**RAINFALL**

**23.18**

**18. And We send down water from the cloud according to a measure, then We cause it to settle in the earth, and most surely We are able to carry it away.**

Shakir, M. H.

### 3.1 INTRODUCTION

In this chapter we shall embark on a more detailed analysis of the relation between the **Qur'ān**. and science. Following the principle of focusing on the primary concerns of man and his relation to his world, the scientific content of the Holy **Qur'ān** will be extricated from its theological setting. In this case, the significance of rainfall, as a component in the causal nexus, and as an instrument of the creator's purpose, will be considered. As always in Qur'anic studies, the intimate linking of practical and conceptual matters will be of first importance, as will be the linking of religious and epistemological ones.

Rain plays a vital role in sustaining life on earth. It results from the interaction of the sun's radiation with the water covering the earth's surface. The processes associated with rain such as evaporation, wind, cloud formation and precipitation are briefly reviewed in the light of scientific findings. These findings will be shown to be in complete agreement with the facts contained in the **Qur'ān**.

### 3.2 SCIENTIFIC INTERPRETATION OF 156 QUR'ANIC VERSES

The statements made in the following Qur'anic verses are perfectly in accord with our present scientific knowledge.

#### Translation of four Qur'anic Scholars

##### The Cow, 2:22

002.022 Who has made the earth your couch, and the heavens your canopy; and sent down rain from the heavens; and brought forth therewith Fruits for your sustenance; then set not up rivals unto God when ye know (the truth).

(Ali, A. Yousuf)

2: 23. WHO made the earth a bed for you, and the heaven a roof, and caused water to come down from the clouds and therewith brought forth fruits for your sustenance; so do not set up equals to ALLAH, while you know.

(Ali, M. Sher)

002.022 Who hath appointed the earth a resting-place for you, and the sky a canopy; and causeth water to pour down from the sky, thereby producing fruits as food for you. And do not set up rivals to Allah when ye know (better).

(Pickthall, M. M.)

22. With a resting place for you and the heaven a canopy and (Who) sends down rain from the cloud then brings forth with it subsistence for you of the fruits; therefore do not set up rivals to Allah while you know.

(Shakir, M. H.)

Allāh causes the fruits to grow from rain water. If there is no rain there will be no fruits nor agriculture. There will be nothing to eat for human beings. In these conditions the rivers will dry up and with the passage of time the seas will also dry up. All living things will die. So the whole system of this world is dependent on rain water.

**The Cow, 2:164**

002.164 Behold! 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 God 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 a people that are wise.

(Ali, A. Yousuf)

2:165. Verily, in the creation of the heavens and the earth and in the alternation of the night and the day, and in the ships that sail the sea with that which profits men, **and in the water which ALLAH sends down from the sky and quickens therewith the earth after its death** and scatters therein all kinds of beasts, and in the change of the winds and the clouds pressed into service between the heaven and the earth-are indeed Signs for the people who use their understanding.

(Ali, M. Sher)

002.164 Lo! In the creation of the heavens and the earth, and the difference of night and day, and the ships which run upon the sea with that which is of use to men, **and the water which Allah sendeth down from the sky, thereby reviving the earth after its death,** and dispersing all kinds of beasts therein, and (in) the ordinance of the winds, and the clouds obedient between heaven and earth: are signs (of Allah's Sovereignty) for people who have sense.

(Pickthall, M. M.)

2.164. Most surely in the creation of the heavens and the earth and the alternation of the night and the day, and the ships that run in the sea with that which profits men, and the water that Allah sends down from the cloud, then gives life with it to theatre after its death and spreads in it all (kinds of) animals, and the changing of the winds and the clouds made subservient between the heaven and the earth, there are signs for a people who understand.

(Shakir, M. H.)

### The Cattle, 6:100

006.099 It is He Who sendeth down rain from the skies: with it We produce vegetation of all kinds: from some We produce green (crops), out of which We produce grain, heaped up (at harvest); out of the date-palm and its sheaths (or spathes) (come) clusters of dates hanging low and near: and (then there are) gardens of grapes, and olives, and pomegranates, each similar (in kind) yet different (in variety): when they begin to bear fruit, feast your eyes with the fruit and the ripeness thereof. Behold! in these things there are signs for people who believe.

(Ali, A. Yousuf)

6:100. And HE it is Who sends down water from the cloud; And WE bring forth therewith every kind of growth; then WE bring forth with that green foliage where from WE produce clustered grain. And from the date-palm, out of its sheaths comes forth bunches hanging low. And WE produce therewith gardens of grapes, and the olive and the pomegranate-like and unlike. Look at the fruit thereof when it bears fruit, and the ripening thereof. Surely, in this are Signs for a people who believe.

(Ali, M. Sher)

006.099 He it is Who sendeth down water from the sky, and therewith We bring forth buds of every kind; We bring forth the green blade from which We bring forth the thick-

clustered grain; and from the date-palm, from the pollen thereof, spring pendant bunches; and (We bring forth) gardens of grapes, and the olive and the pomegranate, alike and unlike. Look upon the fruit thereof, when they bear fruit, and upon its ripening. Lo! herein verily are portents for a people who believe.

(Pickthall, M. M.)

6.100. He it is who sendeth down water from the sky, and therewith We bring forth buds of every kind; We bring forth the green blade from which We bring forth the thick-clustered grain; and from the date-palm, from the pollen thereof, spring pendant bunches; and (We bring forth) gardens of grapes, and the olive and the pomegranate, alike and unlike. Look upon the fruit thereof when they bear fruit, and upon its ripening. Lo! herein verily are portents for a people who believe.

(Shakir, M. H.)

Because of rainfall the dead land bears life. The dry land becomes green. All kinds of vegetation grow out of it. Rain brings life and growth, as drought brings death and famine.

It is the wisdom of Allāh that provides rain. It is explained in these verses that Allāh made every thing for human beings. The intelligent observer may perceive the signs of Allāh's divinity in the works of nature.

**The Rock, 15:22**

015.022 And We send the fecundating winds, then cause the rain to descend from the sky, therewith providing you with water (in abundance), though ye are not the guardians of its stores.

(Ali, A. Yousuf)

**15: 23. And WE send fecundating winds, then WE send down water from the clouds, then WE give it to you to drink, and you could not yourselves store it.**

(Ali, M. Sher)

**015.022 And We send the winds fertilising, and cause water to descend from the sky, and give it you to drink. It is not ye who are the holders of the store thereof.**

(Pickthall, M. M.)

**22. And We send the winds fertilising, then send down water from the cloud so We give it to you to drink of, nor is it you who store it up.**

(Shakir, M. H.)

Winds carry the clouds, and cause the rain to fall. Although the production of artificial rain has been attempted, it has met with little success, for the process depends upon the presence of moisturised clouds. In general scientists have failed to produce artificial rain.

The second meaning of the verse is that it is impossible for man to keep the rain stored in the sky or on the earth for ever. Man has big reservoirs of water but they cannot last for ever.

So the meaning of these verses is that no-one can produce rainfall and keep it in store except Allāh. He is responsible for operating the rain cycle. He provides water for the world.



**The Heights, 7:57**

**007.057** It is He Who sendeth the winds like heralds of glad tidings, going before His mercy: when they have carried the heavy-laden clouds, We drive them to a land that is dead, make rain to descend thereon, and produce every kind of harvest therewith: thus shall We raise up the dead: perchance ye may remember.

(Ali, A. Yousuf)

**7: 58.** And HE it is Who sends the winds as glad tidings before HIS mercy till, when they bear a heavy cloud, WE drive it to a dead land; then WE send down water therefrom and WE bring forth fruits of every kind. In like manner do WE bring forth the dead that you may remember.

(Ali, M. Sher)

**007.057** And He it is Who sendeth the winds as tidings heralding His mercy, till, when they bear a cloud heavy (with rain), We lead it to a dead land, and then cause water to descend thereon and thereby bring forth fruits of every kind. Thus bring We forth the dead. Haply ye may remember.

(Pickthall, M. M.)

**57** and He it is Who sends forth the winds bearing good news before His mercy, until, when they bring up a laden cloud, We drive it to a dead land, then We send down water on it, then bring forth with it of fruits of all kinds; thus shall We bring forth the dead that you may be mindful.

(Shakir, M. H.)

According to geographical knowledge, warm air becomes light then rises up and becomes cool, and a cool breeze blows before it rains. Winds carry the clouds from one place to another.

These verses refer to facts which meteorologists know only now, after centuries of observation.

### **3.2.1. COASTAL RAINFALL**

There are moisturised clouds above the sea. The winds carry these clouds towards dry land. The air blows from a hot place to a cool place (it also blows from the sea towards land at night time) and it carries the clouds to different places. If the air strikes the mountains and rises it becomes cooler; the moisture changes into drops and then it begins to rain. This type of rainfall mostly occurs on coastal areas. This pattern is found especially in Europe and Australia

#### **Yunus, 10:24**

**010.024** The likeness of the life of the present is as the rain which We send down from the skies: by its mingling arises the produce of the earth- which provides food for men and animals: (It grows) till the earth is clad with its golden ornaments and is decked out (in beauty): the people to whom it belongs think they have all powers of disposal over it: There reaches it Our command by night or by day, and We make it like a harvest clean-mown, as if it had not flourished only the day before! thus do We explain the Signs in detail for those who reflect.

(Ali, A. Yousuf)

**10: 25.** The likeness of the present life is only as water which WE sent down from the clouds, then there mingles with it the produce of the earth, of which men and cattle eat till when the earth takes on its ornament and looks beautiful and its owners think that they have full power over it, there comes to it by Our command by night or by day and WE render it like a mown down field, as if nothing existed there the day before. Thus do WE expound the Signs for a people who reflect.

(Ali, M. Sher)

**010.024 The similitude of the life of the world is only as water which We send down from the sky, then the earth's growth of that which men and cattle eat mingleth with it till, when the earth hath taken on her ornaments and is embellished, and her people deem that they are masters of her, Our commandment cometh by night or by day and We make it as reaped corn as if it had not flourished yesterday. Thus do we expound the revelations for people who reflect.**

(Pickthall, M. M.)

**The likeness of this world's life is only as water which We send down from the cloud, then the herbage of the earth of which men and cattle eat grows luxuriantly thereby, until when the earth puts on its golden raiment and it becomes garnished, and its people think that they have power over it, Our command comes to it, by night or by day, So We render it as reaped seed; produce, as though it had not been in existence yesterday; thus do We make clear the communications for a people who reflect**

**Taha, 20:53**

**020.053 "He Who has, made for you the earth like a carpet spread out; has enabled you to go about therein by roads (and channels); and has sent down water from the sky." With it have We produced diverse pairs of plants each separate from the others.**

(Ali, A. Yousuf)

**20: 54. It is HE WHO has made the earth for you a bed and has caused pathways for you to run through it; and WHO sends down rain from the sky and thereby WE bring forth various kinds of vegetation in pairs.**

(Ali, M. Sher)

**020.053 Who hath appointed the earth as a bed and hath threaded roads for you therein and hath sent down water from the sky and thereby We have brought forth divers kinds of vegetation,**

(Pickthall, M. M.)

53. Who made the earth for you an expanse and made for you therein paths and sent down water from the cloud; then thereby We have brought forth many species of various herbs.

(Shakir, M. H.)

**Taha, 20:54**

**020.054 Eat (for yourselves) and pasture your cattle: verily, in this are Signs for men endued with understanding.**

(Ali, A. Yousuf)

**20: 55. 'Eat ye and pasture your cattle. Verily, in this are Signs for those endowed with reason.'**

(Ali, M. Sher)

**020.054 (Saying): Eat ye and feed your cattle. Lo! herein verily are portents for men of thought.**

(Pickthall, M. H.)

**54. Eat and pasture your cattle; most surely there are signs in this for those endowed with understanding.**

(Shakir, M. H.)

Allāh pours down rain to produce plants to provide food for human beings and animals. We eat both plants and animals. If there are no plants, there is no food either for us or for the animals; the animals will die, and there will be nothing to eat for human beings. There will be no crops and no meat. Thus, all life on earth will come to an end.

God states that those who think about these things will know more and will be able to see the signs of the divinity of God.

## **The Thunder, 13:12**

**013.012 It is He Who doth show you the lightning, by way both of fear and of hope: It is He Who doth raise up the clouds, heavy with (fertilising) rain!**

(Ali, A. Yousuf)

**13: 13. HE it is Who shows you the lightning to inspire fear and hope and HE raises the heavy clouds.**

(Ali, M. Sher)

**013.012 He it is Who showeth you the lightning, a fear and a hope, and raiseth the heavy clouds.**

(Pickthall, M. M.)

**12. He it is Who shows you the lightning causing fear and hope and (Who) brings up the heavy cloud.**

(Shakir, M. H.)

Allāh states that He displays the lightning among the clouds, meaning that lightning is produced in clouds. He explains this in detail in the chapter entitled al-Ra'd meaning thunder and also in a chapter of al-Baqarah.

Geographical Science now knows that lightning is produced by clouds.

In these verses it is explained that Allāh raises the heavy clouds which cause rain. It is not stated that rain is caused by the light clouds which of course, do not cause rain. It is known by

geographical science that only moisturised clouds which are full of water are the cause of rainfall.

**Ibrahim, 14:32**

014.032 It is God Who hath created the heavens and the earth and sendeth down rain from the skies, and with it bringeth out fruits wherewith to feed you; it is He Who hath made the ships subject to you, that they may sail through the sea by His command; and the rivers (also) hath He made subject to you.

(Ali, A. Yousuf)

14: 33. ALLAH is HE Who created the heavens and the earth and caused water to come down from the clouds, and brought forth therewith fruits for your sustenance, and HE has subjected to you the ships that they may sail through the sea by HIS command, and the rivers too has HE subjected to you.

(Ali, M. Sher)

014.032 Allah is He Who created the heavens and the earth, and causeth water to descend from the sky, thereby producing fruits as food for you, and maketh the ships to be of service unto you, that they may run upon the sea at His command, and hath made of service unto you the rivers;

(Pickthall, M. M.)

32. Allah is He Who created the heavens and the earth and sent down water from the clouds, then brought forth with it fruits as a sustenance for you, and He has made the ships subservient to you, that they might run their course in the sea by His command, and He has made the rivers subservient to you.

(Shakir, M. M.)

### **The Pilgrimage, 22:63**

**022.063** Seest thou not that God sends down rain from the sky, and forthwith the earth becomes clothed with green? for God is He Who understands the finest mysteries, and is well-acquainted (with them).

(Ali, A. Yousuf)

**22: 64.** Seest thou not that ALLAH sends down water from the sky and the earth becomes green ? ALLAH is indeed the Knower of the subtleties, the All-Aware.

(Ali, M. Sher)

**022.063** Seest thou not how Allah sendeth down water from the sky and then the earth becometh green upon the morrow ? Lo! Allah is Subtle, Aware.

(Pickthall, M. M.)

**63.** Do you not see that Allah sends down water from the cloud so the earth becomes green? Surely Allah is Benignant, Aware.

(Shakir, M. H.)

### **Luqman, 31:10**

**031.010** He created the heavens without any pillars that ye can see; He set on the earth mountains standing firm, lest it should shake with you; and He scattered through it beasts of all kinds. We send down rain from the sky, and produce on the earth every kind of noble creature, in pairs.

(Ali, A. Yousuf)

**31: 11.** HE has created the heavens without any pillars that you can see, and HE has placed in the earth firm mountains that it may not quake with you, and HE has spread therein all kinds of creatures; and WE have sent down water from the clouds, and have caused to grow therein of every fine species.

(Ali, M. Sher)

031.010 He hath created the heavens without supports that ye can see, and hath cast into the earth firm hills, so that it quake not with you; and He hath dispersed therein all kinds of beasts. And We send down water from the sky and We cause (plants) of every goodly kind to grow therein.

(Pickthal, M. M.)

And put mountains upon the earth lest it might convulse with you, and He spread in it animals of every kind; and We sent down water from the cloud, then caused to grow therein (vegetation) of every noble kind.

(Shaker, M. H.)

### The Originator, 35:27

035.027 Seest thou not that God sends down rain from the sky? With it We then bring out produce of various colours. And in the mountains are tracts white and red, of various shades of colour, and black intense in hue.

(Ali, A. Yousuf)

35: 28. Dost thou not see that ALLAH sends down water from the sky, and WE bring forth therewith fruits of different colours; and in the mountains are streaks white and red, of diverse hues, and others raven black ?

(Ali, M. Sher)

035.027 Hast thou not seen that Allah causeth water to fall from the sky, and We produce therewith fruit of divers hues; and among the hills are streaks white and red, of divers hues, and (others) raven-black;

(Pickthal, M. M.)

27. Do you not see that Allah sends down water from the cloud, then We bring forth therewith fruits of various colours; and in the mountains are streaks, white and red, of various hues and (others) intensely black?

(Shaker, M. H.)



All these verses have the same meaning. Allāh is saying that He causes the rain to fall and produces fruit, greenery and every kind of production.

### **The Bee, 16:10**

**016.010 It is He who sends down rain from the sky: from it ye drink, and out of it (grows) the vegetation on which ye feed your cattle.**

(Ali, A. Yousuf)

**16: 11. HE it is who sends down water from the clouds; out of it you have your drink, and there grow from it trees on which you pasture your cattle.**

Ali, M. Sher)

**016.010 He it is Who sendeth down water from the sky, whence ye have drink, and whence are trees on which ye send your beasts to pasture.**

(Pickthal, M. M.)

**10. He it is Who sends down water from the cloud for you; it gives drink, and by it (grow) the trees upon which you pasture.**

(Shaker, M. H.)

According to scientific information, water is of equal importance for human beings, animals and plants. These are all living bodies; if they do not get water they die.

In these verses it is explained that the water is used as drinking water by human beings, animals and trees. The trees get showered

by rain water and become fresh. If there is dust on the trees and air pollution in the atmosphere this will affect the trees and they will soon dry up. The healthy atmosphere which they produce for human beings will be no longer.

The point is that fresh water has to be provided, in order to sustain life. A cycle has to be initiated and maintained.

Allāh instructs man concerning this cycle, which was otherwise not understood at the time.

### **The Bee, 16:65**

**016.065 And God sends down rain from the skies, and gives therewith life to the earth after its death: verily in this is a Sign for those who listen.**

(Ali, A. Yousuf)

**16: 66. And ALLAH has sent down water from the sky and has quickened the earth after its death. Surely, in that is a Sign for a people who would listen to the truth.**

(Ali, M. Sher)

**016.065 Allah sendeth down water from the sky and therewith reviveth the earth after her death. Lo! herein is indeed a portent for a folk who hear.**

(Pickthal, M. M.)

**65. And Allah has sent down water from the cloud and therewith given life to the earth after its death; most surely there is a sign in this for a people who would listen.**

(Shakir, M. H.)

**The Criterion, 25:48**

**025.048 And He it is Who sends the winds as heralds of glad tidings, going before His mercy, and We send down pure water from the sky,-**

(Ali, A. Yousuf)

**25: 49. And HE it is Who sends the winds as glad tidings before HIS mercy, and WE send down pure water from the clouds,**

(Ali, M. Sher)

**025.048 And He it is Who sendeth the winds, glad tidings heralding His mercy, and We send down purifying water from the sky,**

(Pickthal, M. M.)

**48. And He it is Who sends the winds as good news before His mercy; and We send down pure water from the cloud,**

(Shaker, M. H.)

**The Criterion, 25:49**

**025.049 That with it We may give life to a dead land, and slake the thirst of things We have created,- cattle and men in great numbers.**

(Ali, A. Yousuf)

**25: 50. That WE may thereby give life to a dead land, and give it for drink to Our creation - cattle and men in large numbers.**

(Ali, M. Sher)

**025.049 That We may give life thereby to a dead land, and We give many beasts and men that We have created to drink thereof.**

(Pickthal, M. H.)

**49. That We may give life thereby to a dead land and give it for drink, out of what We have created, to cattle and many people.**

(Shaker, M. H.)

### **The Originator, 35:9**

**035.009 It is God 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: even so (will be) the Resurrection!**

(Ali, A. Yousuf)

**35: 10. And ALLAH is HE who sends the winds which raise the clouds; then do WE drive them to a lifeless tract of land, and quicken therewith the earth after its death. Likewise shall the Resurrection be.**

(Ali, M. Sher)

**035.009 And Allah it is Who sendeth the winds and they raise a cloud; then We lead it unto a dead land and revive therewith the earth after its death. Such is the Resurrection.**

(Pickthal, M. M.)

**9. And Allah is He Who sends the winds so they raise a cloud, then We drive it on to a dead country, and therewith We give life to the earth after its death; even so is the quickening.**

(Shaker, M. H.)

### **The Kneeling, 45:5**

**045.005 And in the alternation of Night and Day, and the fact that God sends down Sustenance from the sky, and revives therewith the earth after its death, and in the change of the winds,-are Signs for those that are wise.**

(Ali, A. Yousuf)

45: 6. And in the alternation of night and day, and the provision that ALLAH sends down from the heaven, whereby HE quickens the earth after its death, and in the changing of the winds, are Signs for a people who would use their understanding.

(Ali, M. Sher)

045.005 And the difference of night and day and the provision that Allah sendeth down from the sky and thereby quickeneth the earth after her death, and the ordering of the winds, are portents for a people who have sense.

(Pickthal, M. H.)

5. And (in) the variation of the night and the day, and (in) what Allah sends down of sustenance from the cloud, then gives life thereby to the earth after its death, and (in) the changing of the winds, there are signs for a people who understand.

(Shaker, M. H.)

### Qaf, 50:11

050.011 As sustenance for (God's) Servants;- and We give (new) life therewith to land that is dead: Thus will be the Resurrection.

(Ali, A. Yousuf)

50: 12. As a provision for Our servants; and WE quicken thereby a dead land. Even so shall be the Resurrection.

(Ali, M. Sher)

050.011 Provision (made) for men; and therewith We quicken a dead land. Even so will be the resurrection of the dead.

(Pickthal, M. H.)

**11. A sustenance for the servants, and We give life thereby to a dead land; thus is the rising.**

(Shakir, M. H.)

We know from geographical study that winds set clouds in motion and transport them from one place to another.

In these verses Allāh is saying that He causes the breezes to blow and collects the clouds, then sends them towards dry land to rain. When dry land receives rain water, it becomes fertile, which means it is given life. The proof of this is that clouds move with the help of winds.

Rain water is pure because in the process of evaporation only the clean water, rises into the sky. After some time, the same water returns in the form of rain.

### **The Pilgrimage, 22:5**

022.005 O mankind! if ye have a doubt about the Resurrection, (consider) that We created you out of dust, then out of sperm, then out of a leech-like clot, then out of a morsel of flesh, partly formed and partly unformed, in order that We may manifest (our power) to you; and We cause whom We will to rest in the wombs for an appointed term, then do We bring you out as babes, then (foster you) that ye may reach your age of full strength; and some of you are called to die, and some are sent back to the feeblest old age, so that they know nothing after having known (much), and (further), thou seest the earth barren and lifeless, but when We pour down rain on it, it is stirred (to life), it swells, and it puts forth every kind of beautiful growth (in pairs).

(Ali, A. Yousuf)

22: 6. O people, if you are in doubt concerning the Resurrection, then consider that WE have indeed created you from dust, then from a sperm drop, then from clotted blood, then from a lump of flesh, partly formed and partly unformed, in order that WE make Our power manifest to you. And WE cause what WE will to remain in the wombs for an appointed term; then WE bring you forth as babes; then WE rear you that you may attain to your age of full strength. And there are some of you who are caused to die in the normal course, and there are others among you are kept back till the worst part of life with the result that they know nothing after having had knowledge. **And thou seest the earth lifeless, but when WE send down water thereon it stirs and swells and grows every kind of beautiful vegetation.**

(Ali, M. Sher)

022.005 O mankind! if ye are in doubt concerning the Resurrection, then lo! We have created you from dust, then from a drop of seed, then from a clot, then from a little lump of flesh shapely and shapeless, that We may make (it) clear for you. And We cause what We will to remain in the wombs for an appointed time, and afterward We bring you forth as infants, then (give you growth) that ye attain your full strength. And among you there is he who dieth (young), and among you there is he who is brought back to the most abject time of life, so that, after knowledge, he knoweth naught. **And thou (Muhammad) seest the earth barren, but when We send down water thereon, it doth thrill and swell and put forth every lovely kind (of growth).**

(Pickthal, M. H.)

5.O people! if you are in doubt about the raising, then surely We created you from dust, then from a small seed, then from a clot, then from a lump of flesh, complete in make and incomplete, that We may make clear to you; and We cause what We please to stay in the wombs till an appointed time, then We bring you forth as babies, then that you may attain your maturity; and of you is he who is caused to die, and of you is he who is brought back to the worst part of life, so that after having knowledge he does not know anything; and you see the earth sterile land, but when We send down on it the water, it stirs and swells and brings forth of every kind a beautiful herbage.

(Shaker, M. H.)

### **The Pilgrimage, 22:6**

**022.006 This is so, because God is the Reality: it is He Who gives life to the dead, and it is He Who has power over all things.**

(Ali, A. Yousuf)

**22: 7. That is because ALLAH is Self-Subsisting and All-Sustaining, and that it is HE Who brings the dead to life, and that HE has power over all things;**

(Ali, M. Sher)

**022.006 That is because Allah, He is the Truth and because He quickeneth the dead, and because He is Able to do all things;**

(Pickthal, M. H.)

**6. This is because Allah is the Truth and because He gives life to the dead and because He has power over all things**

(Shaker, M. H.)

### **Ha Mim, 41:39**

**041.039 And among His Signs in this: thou seest the earth barren and desolate; but when We send down rain to it, it is stirred to life and yields increase. Truly, He Who gives life to the (dead) earth can surely give life to (men) who are dead. For He has power over all things.**

(Ali, A. Yousuf)

**41: 40. And of HIS signs is that thou seest the earth lying withered, but when WE send down water on it, it stirs and swells with verdure. Surely, HE, Who quickened it, can quicken the dead also. Verily, HE has power over all things.**

(Ali, M. Sher)

**041.039 And of His portents (is this): that thou seest the earth lowly, but when We send down water thereon it thrilleth and**



**groweth. Lo! He Who quickeneth it is verily the Quickener of the Dead. Lo! He is Able to do all things.**

(Pickthal, M. H.)

**39. And among His signs is this, that you see the earth still, but when We send down on it the water, it stirs and swells: most surely He Who gives it life is the Giver of life to the dead; surely He has power over all things.**

(Shakir, M. H.)

We know by experience that when rain falls on dry soil, the latter absorbs it and swells. Because of this, its bulk increases, and fertilisation is facilitated. Without rain there is no production.

Nowadays we know about this by scientific experiment: water and light are important for the life of plants. Without these two things plants cannot grow.

### **The Believers, 23:18**

**023.018 And We send down water from the sky according to (due) measure, and We cause it to soak in the soil; and We certainly are able to drain it off (with ease).**

(Ali, A. Yousuf)

**23: 19. And WE sent down water from the sky according to a measure, and WE caused it to stay in the earth - and, surely, WE have the power to take it away.**

(Ali, M. Sher)

**023.018 And we send down from the sky water in measure, and We give it lodging in the earth, and lo! We are Able to withdraw it.**

(Pickthal, M. H.)

**18. And We send down water from the cloud according to a measure, then We cause it to settle in the earth, and most surely We are able to carry it away.**

(Shakir, M. H.)

### **The Ornament Of God, 43:11**

**043.011 That sends down (from time to time) rain from the sky in due measure;- and We raise to life therewith a land that is dead; even so will ye be raised (from the dead);-**

(Ali, A. Yousuf)

**43: 12. And Who sends down water from the clouds in proper measure, and WE, thereby, quicken a dead land- even so will you be raised -**

(Ali, M. Sher)

**043.011 And Who sendeth down water from the sky in (due) measure, and We revive a dead land therewith. Even so will ye be brought forth;**

(Pickthal, M. H.)

**43.11. And He Who sends down water from the cloud according to a measure, then We raise to life thereby a dead country, even thus shall you be brought forth;**

(Shakir, M. H.)

These are important verses in which Allāh states that He sends the water to the earth in measured amounts. The water remains on the

earth for a limited period. Allāh says that He has the power to make the water disappear.

Through geographical knowledge we know that if it rains after an extended drought, all the water evaporates. It remains in the form of clouds, water vapour and tiny water drops. After some time the same water returns in the form of rain.

When it rains, the water is used by soil, plants, human beings and animals. The water remains on the land for some time in various forms such as rivers, ponds and streams. The rain water, which is utilised by the trees and soil, flows on the land, evaporates, and returns skywards.

**The Criterion, 25:48**

**025.048 And He it is Who sends the winds as heralds of glad tidings, going before His mercy, and We send down pure water from the sky,-**

(Ali, A. Yousuf)

**25: 49. And HE it is Who sends the winds as glad tidings before HIS mercy, and WE send down pure water from the clouds,**

(Ali, M. Sher)

**025.048 And He it is Who sendeth the winds, glad tidings heralding His mercy, and We send down purifying water from the sky,**

(Pickthal, M. H.)

**48. And He it is Who sends the winds as good news before His mercy; and We send down pure water from the cloud,**

(Shaker, M. H.)

It is known by observation that a cool breeze blows before it rains. After the breeze it rains. This fact is described in these verses.

The rain water is clean and pure. It has also been discovered that during the process of evaporation water becomes hot and clean, since all the germs die. After becoming cool the same water comes back in the form of rainfall. If there were no rain, water would remain on the land and would become foul and undrinkable.

### **The Ant, 27:60**

027.060 Or, Who has created the heavens and the earth, and Who sends you down rain from the sky? Yea, with it We cause to grow well-planted orchards full of beauty of delight: it is not in your power to **cause the growth of the trees in them.** (Can there be another) god besides God? Nay, they are a people who swerve from justice.

(Ali, A. Yousuf)

27: 61. Or, Who created the heavens and the earth, and Who sent down water for you from the sky wherewith **WE cause to grow beautiful orchards ? You could not cause their trees to grow.** Is there a god with ALLAH ? Nay, they are a people who deviate from the right path.

(Ali, M. Sher)

027.060 Is not He (best) Who created the heavens and the earth, and sendeth down for you water from the sky wherewith **We cause to spring forth joyous orchards, whose trees it never hath been yours to cause to grow.** Is there any God beside Allah ? Nay, but they are folk who ascribe equals (unto Him)!

(Pickthal, M. H.)

60. Nay, He Who created the heavens and the earth, **and sent down for you water from the cloud; then We cause to grow thereby beautiful gardens; it is not possible for you that you should make the trees thereof to grow.** Is there a god with Allah? Nay! they are people who deviate.

(Shakir, M. H.)

Allāh tells us that He causes the plants to grow by providing rainfall. Man cannot causes them to grow, because their growth is affected by weather and climate. Only Allāh has control of climate, not man. All depends on the will of God.

#### **The Ant, 27:64**

027.064 Or, Who originates creation, then repeats it, **and who gives you sustenance from heaven and earth?** (Can there be another) god besides God? Say, "Bring forth your argument, if ye are telling the truth!"

(Ali, A. Yousuf)

27: 65. Or, Who originates creation, and then repeats it **and Who provides for you from the heaven and the earth ?** Is there a god with ALLAH ? Say, 'Bring forward your proof if you are truthful.'

(Ali, M. Sher)

027.064 Is not He (best) Who produceth creation, then reproduceth it, **and Who provideth for you from the heaven and the earth ?** Is there any God beside Allah ? Say: Bring your proof, if ye are truthful!

(Pickthal, M. H.)

64. Or, Who originates the creation, then reproduces it **and Who gives you sustenance from the heaven and the earth.** Is there a god With Allah? Say: Bring your proof if you are truthful.

(Shaker, M. H.)

### **The Kneeling, 45:5**

**045.005 And in the alternation of Night and Day, and the fact that God sends down Sustenance from the sky, and revives therewith the earth after its death, and in the change of the winds,- are Signs for those that are wise.**

(Ali, A. Yousuf)

**45: 6. And in the alternation of night and day, and the provision that ALLAH sends down from the heaven, whereby HE quickens the earth after its death, and in the changing of the winds, are Signs for a people who would use their understanding.**

(Ali, M. Sher)

**045.005 And the difference of night and day and the provision that Allah sendeth down from the sky and thereby quickeneth the earth after her death, and the ordering of the winds, are portents for a people who have sense.**

(Pickthal, M. H.)

**5. A command from Us; surely We are the senders (of apostles),**

(Shakir, M. H.)

### **Qaf, 50:11**

**050.011 As sustenance for (God's) Servants;- and We give (new) life therewith to land that is dead: Thus will be the Resurrection.**

(Ali, A. Yousuf)

**50: 12. As a provision for Our servants; and WE quicken thereby a dead land. Even so shall be the Resurrection.**

(Ali, M. Sher)

**050.011 Provision (made) for men; and therewith We quicken a dead land. Even so will be the resurrection of the dead.**

(Pickthal, M. H.)

**50.11. A sustenance for the servants, and We give life thereby to a dead land; thus is the rising.**

(Shaker, M. H.)

Allāh supplies food from the sky in the form of rain and He supplies food from the earth in the form of plants.

God causes the rain to fall from the sky. When it falls on the earth, the different types of plants and crops grow. Man sells them in the market and receives money. Then he uses this money to buy other things. If there is no rain there is nothing for man. So it is proved that God is gives daily provision in the shape of rainfall to man.

God is saying that rain is His benevolence, because the whole world system is dependent on rain.

### **The Spider, 29:63**

**029.63 And if indeed thou ask them who it is that sends down rain from the sky, and gives life therewith to the earth after its death, they will certainly reply, "God!" Say, "Praise be to God!" But most of them understand not.**

(Ali, M. Yousuf)

**29: 64. And if thou ask them, 'Who sends down water from the sky and therewith gives life to the earth after its death ?' They will, surely, say, 'ALLAH.' Say, 'All praise belongs to ALLAH.' But most of them understand not.**

(Ali, M. Sher)

**029.63 And if thou wert to ask them: Who causeth water to come down from the sky, and therewith reviveth the earth after its death ? they verily would say: Allah. Say: Praise be to Allah! But most of them have no sense.**

(Pickthal, M. H.)

**63. And if you ask them Who is it that sends down water from the clouds, then gives life to the earth with it after its death, they will certainly say, Allah. Say: All praise is due to Allah. Nay, most of them do not understand.**

(Shaker, M. H.)

#### **The Romans, 30:24**

**030.024 And among His Signs, He shows you the lightning, by way both of fear and of hope, and He sends down rain from the sky and with it gives life to the earth after it is dead: verily in that are Signs for those who are wise.**

(Ali, A. Yousuf)

**30: 25. And of HIS Signs is that HE shows you the lightning for fear and hope, and HE sends down water from the sky, and quickens therewith the earth after its death. In that, surely, are Signs for a people who understand.**

(Ali, M. Sher)

**030.024 And of His signs is this: He showeth you the lightning for a fear and for a hope, and sendeth down water from the sky, and thereby quickeneth the earth after her death. Lo! herein indeed are portents for folk who understand.**

(Pickthal, M. H.)



**24. And one of His signs is that He shows you the lightning for fear and for hope, and sends down water from the clouds then gives life therewith to the earth after its death; most surely there are signs in this for a people who understand**

(Shaker, M. H.)

In these verses the same thing is explained, that dry land is sterile and by itself cannot produce anything, without water.

In this modern and scientific period when science and technology are advanced, we are still unable to produce anything from dry land. But when the rain falls on it or it is irrigated by the water which remains on the land in different forms e.g. wells, canals and rivers, it is able to produce crops of all kind.

### **The Romans, 30:48**

**030.048 It is God Who sends the Winds, and they raise the Clouds: then does He spread them in the sky as He wills, and break them into fragments, until thou seest rain-drops issue from the midst thereof: then when He has made them reach such of his servants as He wills behold, they do rejoice!-**

(Ali, A. Yousuf)

**30: 49. It is ALLAH Who sends the winds so that they raise the vapours in the form of a cloud. Then HE spreads it in the sky as HE pleases, and then HE spreads it into fragments, and thou seest the rain issuing forth from its midst. And when HE causes it to fall on whom HE pleases of HIS servants, behold ! they rejoice;**

(Ali, M. Sher)

**030.048 Allah is He Who sendeth the winds so that they raise clouds, and spreadeth them along the sky as pleaseth Him, and causeth them to break and thou seest the rain downpouring from within them. And when He maketh it to fall on whom He will of His bondmen, lo! they rejoice;**

(Pickthal, M. H.)

**48. Allah is he Who sends forth the winds so they raise a cloud, then He spreads it forth in the sky as He pleases, and He breaks it up so that you see the rain coming forth from inside it; then when He causes it to fall upon whom He pleases of His servants, lo! they are joyful**

(Shaker, M. H.)

In these verses the geographical process is described: the blowing of the air, the spreading of the clouds, the formation of the clouds in layers, and the falling of rain.

### **YáSin, 36:34-35**

**036.034 And We produce therein orchard with date-palms and vines, and We cause springs to gush forth therein:**

**35. That they may eat of the fruit thereof, and their hands did not make it; will they not then be grateful?**

(Ali, A. Yousuf)

**36: 35. And WE have placed in it Gardens of date-palms and grapes, and WE have caused springs to gush forth therein,**

**36: 36. That they may eat of the fruit thereof, and it was not their hands that made them grow up. Will they not then be grateful ?**

(Ali, M. Sher)

**036.034 And We have placed therein gardens of the date-palm and grapes, and We have caused springs of water to gush forth therein,**

**036.035 That they may eat of the fruit thereof, and their hands made it not. Will they not, then, give thanks ?**

(Pickthal, M. H.)

**34. And We make therein gardens of palms and grapevines and We make springs to flow forth in it,**

**036.35 That they may enjoy the fruits of this (artistry): It was not their hands that made this: will they not then give thanks?**

(Shaker, M. H.)

### **The Companies, 39:21**

**039.21 Seest thou not that God sends down rain from the sky, and leads it through springs in the earth? Then He causes to grow, therewith, produce of various colours: then it withers; thou wilt see it grow yellow; then He makes it dry up and crumble away. Truly, in this, is a Message of remembrance to men of understanding.**

(Ali, A. Yousuf)

**39: 22. Hast thou not seen that ALLAH sends down water from the sky, and causes it to flow in springs in the earth and then brings forth thereby herbage of diverse hues ? Then it dries up and thou seest it turn to yellow; then HE reduces it to broken straw. In that, verily, is a reminder for men of understanding.**

(Ali, M. Sher)

**039.021 Hast thou not seen how Allah hath sent down water from the sky and hath caused it to penetrate the earth as watersprings, and afterward thereby produceth crops of divers hues; and afterward they wither and thou seest them turn**

yellow; then He maketh them chaff. Lo! herein verily is a reminder for men of understanding.

(Pickthal, M. H.)

**21. Do you not see that Allah sends down water from the cloud, then makes it go along in the earth in springs, then brings forth therewith herbage of various colours, then it withers so that you see it becoming yellow, then He makes it a thing crushed and broken into pieces? Most surely there is a reminder in this for the men of understanding.**

(Shaker, M. H.)

### **Those Who Pull Out, 79:31**

**079.031 He draweth out therefrom its moisture and its pasture;**

(Ali, A. Yousuf)

**79: 32. HE has produced therefrom its water and its pasture,**

(Ali, M. Sher)

**079.031 And produced therefrom the water thereof and the pasture thereof,**

(Pickthal, M. H)

**31. He brought forth from it its water and its pasturage.**

(Shaker, M. H.)

In these verses Allāh asks: Do you observe that God showers rain from the sky? Then this water flows in the form of springs in the land, and plants grow in different colours and shapes with the help of this water.

### **3.2.2.SPRINGS**

In Geographical Science springs are described as water which flows automatically from the pores of the land.

#### **The Great Event, 78:14**

**078.014 And do We not send down from the clouds water in abundance,**

(Ali, A. Yousuf)

**78: 15. And WE send down from the dripping clouds water pouring forth abundantly.**

(Ali, M. Sher)

**078.014 And have sent down from the rainy clouds abundant water,**

(Pickthal, M. H.)

**14. And We send down from the clouds water pouring forth abundantly,**

(Shaker, M. H.)

#### **He Frowned, 80:25**

**080.025 For that We pour forth water in abundance,**

(Ali, A. Yousuf)

**80: 26. How WE pour down water in abundance,**

(Ali, M. Sher)

**080.25 How We pour water in showers**

(Pickthal, M. H.)

**25. That We pour down the water, pouring (it) down in abundance,**

(Shaker, M. H.)

Allāh says that the rainfall comes only from nimbostratus clouds. It means that rain falls from moisturised clouds and those clouds which are full of water. There are different types of clouds. Most of them cannot produce rain.

### 3.3 DESCRIPTION OF WIND MOVEMENTS

045.005 And in the alternation of Night and Day, and the fact that God sends down Sustenance from the sky, and revives therewith the earth after its death, and in the change of the winds,- are Signs for those that are wise.

(45:5)

General wind distribution is mentioned in the Qur'ān. This verse indicates that there is an organised distribution of wind and that the circulation is due to specific laws.

The different types of winds can be described in terms of the forces which create the winds and in terms of specific types of winds. The general wind circulation of the earth consists of global scale winds which result from the combinations of radiation balance, latitudinal heat transfer, earth rotation and land-sea differences. The earth's surface characteristics also act in conjunction with the above factors to produce the general circulation.

Synoptic scale winds are those weather disturbances which relate to the effects of low and high pressure centres. The flowing of air from high to low pressure areas occurs, and the rotation of the earth affects these flows. Large air masses form through these effects, and cold, warm and occluded frontal surfaces occur where air masses collide. The effect of air masses spreading and forming certain weather patterns is described in the Qur'ān.

**77.03** And scatter (things) far and wide;

**77.04** Then separate them, one from another,  
(77:3-4)

With regard to local-scale winds the Qur'ān says:

**051.001 By the (Winds) that scatter broadcast;**

**051.002 And those that lift and bear away heavy weights;**

(51:1-2)

These verses indicate that two forces, vertical and horizontal, are at work in with these winds.

Wave-type winds are involved with mountain down-slope winds and wave clouds. The Qur'ān also describes this type of wind:

**077.001 By the (Winds) sent forth one after another (to man's profit);**

**077.002 Which then blow violently in tempestuous Gusts,**

(77:1-2)

Thus, the types of winds and their patterns and circulation were recognised in the Qur'ān 1400 years ago. The observational approach to wind in the Qur'ān is remarkable, since, although knowledge of large-scale winds had been known for centuries to seafaring people, it was not until the 18th century that a reasonable explanation for their occurrence was established. However, the Qur'anic verses agree completely with contemporary meteorological observation.



### **3.4 THE EFFECT OF WIND IN THE FORMATION OF CLOUDS**

In scientific studies, it is now recognised that wind plays a vital role in the formation of clouds. Major effects in this process involve the hydrologic cycle, the physics of cloud formation and specific factors for certain types of clouds.

The hydrologic cycle consists of the storage, transport and circulation of water as it evaporates from the ocean and earth. The factors involved in the physics of cloud formation are the rising and cooling of air and the process of nucleation. The Qur'ān refers to the physical process of nucleation:

**015.022 And We send the fecundating winds, then cause the rain to descend from the sky, therewith providing you with water (in abundance), though ye are not the guardians of its stores.**

(15:22)

The fertilising winds provide the small nuclei necessary for the condensation of cloud droplets in the atmosphere and eventual rain formation.

Specific effects of the wind are large-scale lifting, convection, wave motion and a combination of these mechanisms. Large-scale lifting causes cloud formation through the effects of fronts, and also through hills and mountains, which force wet air masses to rise. This effect is specifically mentioned in the Qur'ān:

**It is God Who sends the Winds, and they raise the Clouds: then does He spread them in the sky as He wills, and break them into fragments, until thou seest rain-drops issue from the midst thereof: then when He has made them reach such of his servants as He wills, behold, they do rejoice!-**

**(30:48)**

Thermal properties of the earth's surface can cause turbulent convection winds which result in the formation of convective and cumulonimbus clouds. Sea breezes, mountain valley circulations and convective storm outflow also cause cloud formation through convection. Wave motion in the atmosphere and over mountains can form wave clouds.

The combination of the wind mechanisms above causes the formation of banded convective structures in hurricanes and cyclones, ahead of cold fronts, and as squall lines. Convection can occur in layer clouds as well. Such structures have both convective and wave properties.

A combination of wind factors is also included in the following Qur'anic verse:

**007.057 It is He Who sendeth the winds like heralds of glad tidings, going before His mercy: when they have carried the heavy-laden clouds, We drive them to\_a land that is dead, make rain to descend thereon, and produce every kind of harvest therewith: thus shall We raise up the dead: perchance ye may remember.**

**(7:57)**

This verse clearly indicates that the wind has a horizontal force in the movement of air masses and a vertical force in uplifting a "heavy cloud". It also refers to the hydrologic cycle and to convective motion.

In spite of the lack of scientific knowledge at that time, the Qur'anic verses clearly indicate the factors involved in the relationship of the wind to cloud formation.

### **3.5 WATER CYCLE**

In geographical science the process of rainfall is called the water cycle. At the time of the revelation of the Holy Qur'ān the water cycle was not fully understood. Water is conserved throughout the cycle it undergoes. More than 97% of water is found in the oceans, the remaining proportion is found on the continents, mainly in the polar ice caps.<sup>44</sup>

The size of the oceans is much greater than that of the dry land. The whole area of the earth is 200 million square miles. From this 141 million square miles are covered with water. This means that the dry land area is approximately 29.2% and the water area is 70.8%.<sup>45</sup> Due to sunlight and heat, the water evaporates from oceans, rivers, streams, fountains, ponds, trees and plants, and is then stored in the sky in the form of clouds.

Atmospheric water vapour is driven upwards by vertical air currents. It is then spread horizontally by wind which causes turbulence on a large scale. Part of the water vapour will condense in due time to form clouds which will eventually precipitate out some of their contents as rainfall and other forms of precipitation. This is how water is returned back to earth and the cycle is thus completed.<sup>46</sup>

We now have a good knowledge of the water cycle phenomenon built over centuries of observation and deduction. Fourteen hundred years ago, such knowledge was non-existent, yet the picture conveyed to us by the Qur'ān regarding the subject of rainfall is in complete harmony with our present knowledge of the matter. Thus,

the Qur'ān says,

**48. Allah is he Who sends forth the winds so they raise a cloud, then He spreads it forth in the sky as He pleases, and He breaks it up so that you see the rain coming forth from inside it; then when He causes it to fall upon whom He pleases of His servants, lo! they are joyful**

(30:48)

71% of water is absorbed by non irrigated-and, that is forests and browse vegetation (16%), farm-crop and pasture (23%) and non-economic vegetation (32%). The rest goes to stream flow, which feeds lakes, reservoirs and rivers.<sup>47</sup> The resulting proportions ensure a balanced distribution of water over the earth's surface, thus maintaining a balanced biological and ecological life, which is implied in the following verses:

**18. And We send down water from the cloud according to a measure, then We cause it to settle in the earth, and most surely We are able to carry it away.**

(23:18)

**11. And He Who sends down water from the cloud according to a measure, then We raise to life thereby a dead country, even thus shall you be brought forth;**

(43:11)

On a daily basis 3.5 mm of water is evaporated from the earth's surface. This amount of water is stored in the atmosphere as clouds. When it can no longer be stored in the clouds, it precipitates out as rain or other forms. The amount stored can reach the equivalent of 25 mm and can remain in the clouds for only 10 days, before precipitating out. This 10 day storage is equal to 25 mm of rainfall on earth. In this way, during the whole year the average amount of

rainfall is 914 mm, over the whole surface of the earth. Rainfall is not equally distributed. It affects some places more than others. For example, the highest amount of rainfall occurs in the Indian city of Charapoongi. The western coast of India is also known for its extensive rainfall.

The amount of rainfall over a particular region of the earth is influenced by its geography. Some flat regions are rich in clouds, but because there are no high mountains to stop the clouds and cause them to precipitate rain, they remain dry. Other mountainous regions benefit from this effect and are therefore wet.

Generally, the size of a drop of rain varies from ~ 5 mm to 6 mm. If there are many layers of clouds, then the drops which fall from the higher layers coalesce with other drops to make their size larger, but often they break up on the way.

If the rain falls over a large area then often it does not rain heavily. If it rains on a small area then it is more intense. In these intense downpours, duration rarely exceeds 30 minutes, especially if the rain accompanies a thunder storm, but in this limited period up to 2~5 mm may fall.

### 3.6 ARTIFICIAL RAINFALL

Attempts to influence the weather by inducing precipitation or suppressing hail have been carried out by man with limited success. To achieve precipitation, clouds are seeded with silver iodide or solid carbon dioxide (dry ice) released either from aircraft or ground-based rockets. The particles released serve as nuclei for the condensation of water vapour contained in the clouds. The devastating effects of hailstorms can be reduced or even prevented by releasing a quantity of these compounds into potential hailstorms. The assumption is that a larger number of ice crystals which favour the development of hailstones are transformed into smaller and more numerous hailstones. As a result, the potential damage of the hail is reduced as the smaller hailstones melt by the time they reach the ground.<sup>48</sup> Although various methods have been tried by man, the results are not always positive.

The possibility of influencing the weather is limited to a small number of countries with technical know-how and means. In the first place, moisturised clouds must be present and the nucleating agents must be sufficiently dispersed in the clouds. Several experiments aimed at increasing rainfall have actually resulted in reduced precipitation,<sup>49</sup> which suggests the interplay of some unknown factors. The process of rainfall is a complex phenomenon beyond our control despite the modest efforts of man to influence it. It is clearly managed by a powerful force which integrates it into other phenomena which sustain and preserve rich and diverse life on earth. It is a bounty from Allāh as revealed in the Qur'ān.

**14. And We send down from the clouds water pouring forth  
abundantly**

(78:14)

**25. That We pour down the water, pouring (it) down in  
abundance,**

(80:25)



### 3.7 CLASSIFICATION OF RAIN CLOUDS

The classification of rain clouds can be made either through cloud appearance or through the forcing mechanisms which produce the clouds.

The general classification of rain clouds includes nimbostratus, cumulonimbus, and nimbostratus with embedded convection. The nimbostratus are layer clouds, generally produced by the effects of widespread large-scale lifting. Cumulonimbus are convective clouds, generally produced by local-scale surface-temperature differences, or local-scale lifting mechanisms in a convectively unstable environment. Nimbostratus with embedded convection frequently occurs in conditions of widespread lifting with conditional instability and a moist air mass.

The general classification of rain clouds by forcing mechanisms includes clouds formed by large-scale lifting, convective processes, waves in the atmosphere and combinations of these processes.

The Qur'ān mentions three types of rain clouds which are in harmony with the types given above. Clouds formed by large-scale lifting, or nimbostratus, are called *tabaqī*, or *munbasit* clouds:

**030.048 It is God Who sends the Winds, and they raise the Clouds: then does He spread them in the sky as He wills, and break them into fragments, until thou seest rain-drops issue from the midst thereof: then when He has made them reach such of his servants as He wills behold, they do rejoice!-**

(30:48)

Clouds formed by convective processes, or cumulonimbus, are called *rukamī* clouds:

**024.043** Seest thou not that God makes the clouds move gently, then joins them together, then makes them into a heap? - then wilt thou see rain issue forth from their midst. And He sends down from the sky mountain masses (of clouds) wherein is hail: He strikes therewith whom He pleases and He turns it away from whom He pleases, the vivid flash of His lightning well-nigh blinds the sight.

(24:43)

The Qur'ān mentions a third type of cloud called *mu'sirāt*, and this cloud forms through a combination of processes:

**078.014** And do We not send down from the clouds water in abundance,

**078.015** That We may produce therewith corn and vegetables,

**078.016** And gardens of luxurious growth?

(78:14-16)

Thus the classification of clouds used in the Qur'ān is also according to the forcing mechanisms for their formation. The understanding of the types of wind currents and conditions for cloud formation is part of the most recent research in meteorology. Yet, these observations in the Qur'ān are completely compatible with the types of cloud classification in use today.

### **3.8 DESCRIPTION OF CUMULIFIED CLOUDS IN THE HOLY QUR'ĀN**

**024.043** Seest thou not that God makes the clouds move gently, then joins them together, then makes them into a heap? then wilt thou see rain issue forth from their midst. And He sends down from the sky mountain masses (of clouds) wherein is hail: He strikes therewith whom He pleases and He turns it away from whom He pleases, the vivid flash of His lightning well-nigh blinds the sight.

(24:43)

This verse describes the formation and physical phenomena of cumulonimbus clouds. Three stages are indicated for the formation of these clouds. In order, these are the increase in momentum of cumulus clouds, the merging of such clouds and consequent increase in cumulation. The verse also indicates that when the cumuliform cloud is as big as a mountain, hail may be expected to be contained in the cloud. It is also mentioned that one cannot know where the hail will fall. It is also pointed out that lightning is an indication of hail particles in the cloud.

### **3.9 THE PROCESS OF FORMATION OF NIMBOSTRATUS CLOUDS**

Clouds were classified around the beginning of the 19th century, first by Baptist Lamarck, and then by Luke Howard. A modified version of Howard's classification scheme is in use today.

Nimbostratus clouds are produced by the effects of widespread large-scale lifting. Factors involved in the process are the hydrologic cycle and wind transport of cloud nuclei. Synoptic and local circulation play a role in the generation of horizontal winds, and topography is involved in the lifting. As the air is lifted, it cools, resulting in the condensation of moisture on nuclei and the formation of cloud droplets. Embedded convection may also be present. These droplets grow and aggregate to form rain. The resulting rainfall is distributed according to topography, with the sides of mountains or hills oriented towards the prevailing winds being moist and the downwind sides being dry.

The Qur'ān describes different types of clouds and the processes responsible for their formation. With regard to nimbostratus clouds, which are called *tabaqī* the Qur'ān says,

**030.048 It is God Who sends the Winds, and they raise the Clouds: then does He spread them in the sky as He wills, and break them into fragments, until thou seest rain-drops issue from the midst thereof: then when He has made them reach such of his servants as He wills behold, they do rejoice!-**

(30:48)

This verse indicates that wind evaporates water vapour and activates the formation of the clouds. As the clouds form, they spread into a layer and as the spreading continues, the clouds can separate into fragments. After the fragmentation, rain will fall. These clouds do not produce hail or thunderstorms.

This verse gives us the major steps in the formation of nimbostratus clouds and the time of the appearance of rain after the first three steps have been completed, and describes the main characteristics of this kind of cloud.

### **3.10 LIGHTNING AND THUNDER**

Lightning is defined as a transient high-current electric discharge which occurs when some region of the atmosphere attains an electric charge large enough to make the normally insulating air into a conductor.

Thunder occurs when the large electric current which flows through the air during lightning heats up the air in its path instantaneously; the expansion of the air due to the temperature rise causes a sonic boom.

The most common producer of lightning is the thundercloud<sup>50</sup> and along with that comes thunder. Man, now having a working hypothesis of the causes of rain, lightning and thunder, is not scared of these powerful forces of nature, but for man of 1400 years ago it was consoling for him to have faith in God and know that he would not be harmed by these mighty displays of nature:

**12. He it is Who shows you the lightning causing fear and hope and (Who) brings up the heavy cloud.**

(13:12)

Lightning discharges are composed of very large electric currents of typically 30,000 A (Amperes) but up to 200,000 peaks have been recorded. The time taken by a lightning stroke is anywhere between one-hundredth to one hundred-thousandth of a second. A typical storm dissipates a large amount of energy and a small storm of 1km radius would be equivalent in energy to 10 atomic bombs of the type used in Hiroshima. Considering the earth as a whole, about

2000 thunderstorms are taking place at any given time.<sup>51</sup> So we can see the potential destructive energy of lightning.

**19. Or like abundant rain from the cloud in which is utter darkness and thunder and lightning; they put their fingers into their ears because of the thunder peal, for fear of death, and Allah encompasses the unbelievers.**

**20. The lightning almost takes away their sight; whenever it shines on them they walk in it, and when it becomes dark to them they stand still; and if Allah had pleased He would certainly have taken away their hearing and their sight; surely Allah has power over all things.**

(2:19-20)

The understanding of such events and manifestations of nature is called for by the Qur'ān. What is happening around us reminds us of the power of Allāh.

### **3.11 LIGHTNING AND CHEMICALS**

As explained earlier, lightning is a very powerful discharge of electric energy. The temperature of the air column through which the discharge travels reaches about 15,000 degrees Celsius in a few ten-millionths of a second. At these high temperatures chemical reactions take place spontaneously. Especially important are the formation of free radicals of nitrogen and oxygen.<sup>52</sup>

Normally occurring nitrogen in the air is composed of two nitrogen atoms combined together to form a nitrogen molecule. This form of nitrogen is inert and this nitrogen bond has to be broken before it can be incorporated into living organisms. Nitrogen goes into the formation of amino acids, the basic building blocks of organic life on earth.<sup>53</sup>

Free nitrogen atoms combine with free oxygen atoms to form nitrogen oxide (NO) and nitrogen dioxide (NO<sub>2</sub>). The nitrogen dioxide dissolves in the rain and comes down to earth in the form of a dilute solution. In time this becomes part of the nitrogen in the soil. This process is called nitrogen fixation and lightning is one of two processes in nature by which this result is obtained.<sup>54</sup>

Ozone has also been found around electric fields in the clouds and the ground during storms and it is also thought that lightning may itself be producing ozone.<sup>55</sup>

**24. And one of His signs is that He shows you the lightning for fear and for hope, and sends down water from the clouds then gives life therewith to the earth after its death; most surely there are signs in this for a people who understand**

(30:24)



### **3.12 THE BENEFITS OF RAINFALL**

The main effects of water moving through the water cycle are its key role in the energy balance of the earth and its great importance in landscape formation. The main chemical effects of it result from interaction between soil water and both the soil particles and the parent bed rock.<sup>56</sup>

The process of rain is quite remarkable. This whole procedure is similar to what we can do in a laboratory. Boil some water in a beaker, remove the steam and condense it in another container to obtain water of over 99% purity. This process is called distillation and by these means water can be purified. By this action any kind of water can be cleaned, because this process separates the germs, filth, insoluble and dissolved compounds.

Now imagine the grand scale of the same process applied in the form of evaporation and precipitation to the earth as a whole. The Holy Qur'ān states that rain water is pure, clean and above all it is holy.

**48. And He it is Who sends the winds as good news before His mercy; and We send down pure water from the cloud.**

**49. That We may give life thereby to a dead land and give it for drink, out of what We have created, to cattle and many people.**

(25:48-49)

The chemistry of this water has been explained. Raw water is not only pure but it has the ability to be used as a purifying agent. In the Holy Qur'ān, there is an important statement in praise of this water.

**9. And We send down from the cloud water abounding in good, then We cause to grow thereby gardens and the grain that is reaped,**

(50:9)

This water is full of blessings, it is holy and clean because of its purity, and that is why it is the best for every purpose.

**11. When He caused calm to fall on you as a security from Him and sent down upon you water from the cloud that He might thereby purify you, and take away from you the uncleanness of the Shaitan, and that He might fortify your hearts and steady (your) footsteps thereby.**

(8:11)

Ibn Kathīr reports concerning Ali that he always advised patients to seek a cure in writing verses from the Holy Qur'ān, washing the ink off with rain water, adding honey to it and then drinking it. By the grace of Allāh, they would recover.

'A'ishah reports that the Prophet Muhammad (peace be upon him) said:

ان التمام عرق العلية اذا تحرك اذى  
ما صبها فداؤها بالماء المرق والحسل (البواردي)

Water is essential for sustaining life on earth. Every living organism, from the smallest to the largest, depends on it. Rain recycles the used water and provides a constant source. In principle, the technology for obtaining drinking water from sea-water exists.

However, the cost of such an operation is high in terms of energy consumption and distribution of the final product to where it is needed most. Therefore man is still dependent on the natural process of rain to provide water for his uses.

**015.022 And We send the fecundating winds, then cause the rain to descend from the sky, therewith providing you with water (in abundance), though ye are not the guardians of its stores.**

(Ali, A. Yousuf)

He needs water for consumption, to grow food and for personal hygiene. In times of drought, mankind suffers great distress. Sources of livelihood such as agricultural produce and cattle are first threatened, depriving people of the means of sustenance. This can occur on a massive scale, as has been experienced recently in certain parts of the world. The anguish and despair in the face of drought is illustrated in a very moving manner by the two following verses.

**49. Though they were before this, before it was sent down upon them, confounded in sure despair.**

(30:49)

**And He it is Who sends down the rain after they have despaired, and He unfolds His mercy; and He is the Guardian, the Praised One.**

(42:28)

When it did not rain the Prophet (peace be upon him) prayed Salat al-Istisqā for it; when it rained more than required he prayed for it to stop.

'A'isha states that when it rained the Prophet (peace be upon him) prayed:

"Oh Allāh! (send us) a beneficial downpour."

ان رسول الله صلى الله عليه وسلم كان اذا  
رأى المطر قال اللهم صبنا نافعاً (بخاري)

Rain is a part of the natural water cycle. Upon it depends a sensitive biosphere, containing all the small cycles and inter-dependencies. Of the radiation from the sun reaching the earth, the oceans absorb about 95%, the desert about 70% and snow about 15%. The earth has an average absorption of about 40%. From this, it can be seen that the oceans absorb the largest quantity of radiation. As a result the oceans play a large part in the water cycle as well as in regulating the average temperature of the earth.

The fine temperature balance which exists on the earth's surface is due to the role played by the interaction of the oceans and solar radiation which is the origin of water evaporation, cloud formation and rain.

The earth's surface is constantly changed by the effect of rain. Heavy rain causes soil to erode and rivers to flow, carrying sediments and depositing them in plains, making them fertile for agricultural produce and hence a source of prosperity.

The erosion caused by heavy rain is the subject of this verse:

O ye who believe ! cancel not your charity by reminders of your generosity or by injury like those who spend their substance to be seen of men, but believe neither in Allah nor in the last day They are in parable like a hard barren rock, on which is a little soil; on it falls heavy rain which leaves it (just) a bare stone. They will be able to do nothing with aught they have earned. And Allah guideth not those who reject faith.

(2:264)

On the other hand, light rain helps the irrigation of land, needed for the growth of plants and the well-being of animals.

And the likeness of those who spend their substance, seeking to please Allah and to strengthen their souls, is as a garden, high and fertile; heavy rain falls on it but makes it yield a double increase of harvest, and if it receives not heavy rain, light moisture sufficeth it. Allah seeth well whatever ye do.

(2:265)

### 3.13 CONCLUSION

The various processes which occur on the earth's surface such as evaporation, cloud formation, lightning and rainfall are primarily caused by the effect of the sun's radiation. These processes maintain life on earth by causing plants to grow, which in turn sustain human and animal life. The regulation of such complex interactions cannot rest on a blind game of chance. The maintenance of such a fine equilibrium clearly necessitates the intervention of an All-Knowing and Omnipotent Being, Allāh, the creator of the universe. The Qur'ān reveals facts which have been established only recently through scientific endeavour. These facts could not be known by normal methods fourteen hundred years ago. This is clear evidence of the divine origin of the facts revealed in the Qur'ān and of the Qur'ān itself. It will be shown later in this thesis that the facts relevant to other phenomena as related by the Qur'ān are also in harmony with modern science.

Rainfall is clearly part of a larger process. The ecology of the planet is not sustained by rainfall alone but is also supplemented by the processes whereby the fertile lands of the earth are enriched by the soils which wash down from the high ground into the plains and valleys in which mankind reaps his harvest of fruit and crops. Agricultural production as such will be the topic of the fifth chapter, "Plant Production". In the following chapter, however, the process of the creation of fertile soils will focus our attention. While bearing in mind that sedimentation is an isolatable process which for the purposes of science, may be studied as an entity in itself, we also remember that the whole contains the essence. The wisdom of the

Qur'ān consists in recognition of the complete cycle, indivisible from the purposes with which it has been invested: that is the benevolent creation of a system amenable to the human creatures which live within it. The distribution of the optimum types and quantities of particles to the crop lands of the earth by the process of sedimentation attests to this wisdom.

### 3.14 REFERENCES

44. Gradual, T. E., & Curtain, P. J., Atmospheric Change: An Earth System Perspective, New York, 1993, 96.
45. Gross, M. Grant, Oceanography: A View of the Earth (7th ed.), Upper Saddle River (N. J.), 1996, 32.
46. Summer, Graham, Precipitation: Process & Analysis, Chichester, 1988, 3.
47. Press, F. & Sieve, R., Earth (4th ed.), New York, 1984, 141.
48. McHenry, Robert, NEB, (The New Encyclopaedia Britannic, 15th ed.), Vols. 16 & 17, Chicago, 1992, 518-519, 653.
49. Ibid, Vol. 12, 540.
50. Man, Martin. A., Lightning, New York, 1969, 1.
51. Sutton, Graham, The Weather, London, 1974, 86-87.
52. McHenry, op. cit., Vol. 2, 114.
53. Ibid., Vols. 15 & 16, 364, 970.
54. Eden, Philip & Twist, Client, Weather Facts, London, 1995, 100.



55. Man, op. cit., 164.

56. UNESCO/FE Group, Man's influence on the Hydrologic Cycle: A draft Report, Rome, 1973, 3.

**CHAPTER NO. 4**  
**SEDIMENTATION**

**013.017 He sendeth down water from the sky, so that valleys flow according to their measure, and the flood beareth (on its surface) swelling foam - from that which they smelt in the fire in order to make ornaments and tools riseth a foam like unto it - thus Allah coineth (the similitude of) the true and the false. Then, as for the foam, it passeth away as scum upon the banks, while, as for that which is of use to mankind, it remaineth in the earth. Thus Allah coineth the similitudes.**

Pickthall, M. M.

## 4.1 INTRODUCTION

In the third chapter, the verses of the Holy Qur'ān explaining the rainfall cycle were referred to. They explain erosion by rainfall and sediment suspension in water. This chapter will also describe the deposition of sediment in different regions of the earth.

This study presents the results of sedimentation research performed in different laboratories in the sedimentology Unit, Zoology Department, Glasgow University. The study material, consisting of sediment, was collected from the Ardmore Bay on the river Clyde Estuary during 1991-92. The study presents a factual comparison between the Qur'anic verses and sedimentary research in figures, calculations, diagrams, sediment analysis and electronic microscopy.

The results of dry sieving analysis and wet sieving analysis confirm that in spite of being mixed, the soil contains different types of material (sediment) which was the local grain but was transported by rivers from elsewhere, a process described in the Holy Qur'ān, verse 264 of surah No. 2. The sediment was scattered in a way corresponding to verse 4 of surah No. 13; some sediment remains in suspension for some time again as specifically referred to in the Holy Qur'ān, verse 17 surah No. 13.

The study includes my interpretation of the Holy verses. It discusses them according to results which are confirmed scientifically and not merely tentative or untested. They bear out assertions put forward in the Holy Qur'ān.

## 4.2 SCIENTIFIC INTERPRETATION OF 28 QUR'ANIC VERSES

### Translation by four Qur'anic scholars

#### The Cow, 2:264

002.264 O ye who believe! cancel not your charity by reminders of your generosity or by injury,- like those who spend their substance to be seen of men, but believe neither in God nor in the Last Day. They are in parable **like a hard, barren rock, on which is a little soil: on it falls heavy rain, which leaves it (Just) a bare stone.** They will be able to do nothing with aught they have earned. And God guideth not those who reject faith.

(Ali, A. Yousuf)

2:265. O ye who believe ! render not vain your alms by reproach and injury like him who spends his wealth to be seen by men, and he believes not in ALLAH and the Last Day. His case is like the **case of a smooth rock covered with earth, on which heavy rain falls, leaving it bare and hard,** They shall not secure aught of what they earn. And ALLAH guides not the disbelieving people.

(Ali, M. Sher)

002.264 O ye who believe! Render not vain your almsgiving by reproach and injury, like him who spendeth his wealth only to be seen of men and believeth not in Allah and the Last Day. His likeness is as **the likeness of a rock whereon is dust of earth; a rainstorm smiteth it, leaving it smooth and bare.** They have no control of aught of that which they have gained. Allah guideth not the disbelieving folk.

(Pickthall, M. M.)

264. O you who believe! do not make your charity worthless by reproach and injury, like him who spends his property to be seen of men and does not believe in Allah and the last day; so his parable is as the parable of a smooth rock with earth upon it, then a heavy rain falls upon it, so it leaves it bare; they shall not be able to gain anything of what they have earned; and Allah does not guide the unbelieving people.

(Shakir, M. H.)

In this verse Allāh describes the erosion of soil away from rocks. The same thing is described in geographical science. Soil on mountains is eroded by heavy rain and is subsequently carried away by river water.

River water contains variegated particles from the soil eroded from various places. This material is deposited at several places. The type of sedimentation created by this soil-deposition possesses high fertility. Several river valleys are famous for their fertility, such as the valley of the River Nile and the valley of the River Indus.

In this verse, the process of erosion by rainfall is explained. According to it, the soil eroded from the mountains and rocks is carried down by rivers. The same explanation is given by geographical science.

### **The Cow, 2:265**

002.265 And the likeness of those who spend their substance, seeking to please God and to strengthen their souls, is as a garden, high and fertile: heavy rain falls on it but makes it yield a double increase of harvest, and if it receives not Heavy rain, light moisture sufficeth it. God seeth well whatever ye do.

(Ali, A. Yousuf)

2:265. O ye who believe ! render not vain your alms by reproach and injury like him who spends his wealth to be seen by men, and he believes not in ALLAH and the Last Day. His case is like **the case of a smooth rock covered with earth, on which heavy rain falls, leaving it bare and hard**, They shall not secure aught of what they earn. And ALLAH guides not the disbelieving people.

(Ali, M. Sher)

002.265 And the likeness of those who spend their wealth in search of Allah's pleasure, and for the strengthening of their souls, is as **the likeness of a garden on a height. The rainstorm smiteth it and it bringeth forth its fruit twofold. And if the rainstorm smite it not, then the shower.** Allah is Seer of what ye do.

(Pickthall, M. M.)

265. And the parable of those who spend their property to seek the pleasure of Allah and for the certainty 'of their souls is as **the parable of a garden on an elevated ground, upon which heavy rain falls so it brings forth its fruit twofold but if heavy rain does not fall upon it, then light rain (is sufficient);** and Allah sees what you do.

(Shakir, M.H.)

This verse refers to light rainfall, which helps in the growth of fruit-trees and agricultural plants situated in hills and mountains.

In mountainous regions, it tends to rain heavily, and the most fertile soil is lost, rendering this environment poor for crops, while in hot plains the crops require more water than usual to grow. It is the total ecology which is significant: heavy rain is required to wash fertile material from the mountains; this accumulates in the rich plains, where a lighter rainfall is necessary for the production of fruit and vegetation.

### **The Elevated Places, 7:57**

007.057 It is He Who sendeth the winds like heralds of glad tidings, going before His mercy: when they have carried the heavy-laden clouds, We drive them to a land that is dead, make rain to descend thereon, and produce every kind of harvest therewith: thus shall We raise up the dead: perchance ye may remember.

(Ali, A. Yousuf)

7: 58. And HE it is Who sends the winds as glad tidings before HIS mercy till, when they bear a heavy cloud, WE drive it to a dead land; then WE send down water therefrom and WE bring forth fruits of every kind. In like manner do WE bring forth the dead that you may remember.

(Ali, M. Sher)

007.057 And He it is Who sendeth the winds as tidings heralding His mercy, till, when they bear a cloud heavy (with rain), We lead it to a dead land, and then cause water to descend thereon and thereby bring forth fruits of every kind. Thus bring We forth the dead. Happily ye may remember.

(Pickthall, M.M.)

57. And He it is Who sends forth the winds bearing good news before His mercy, until, when they bring up a laden cloud, We drive it to a dead land, then We send down water on it, then bring forth with it of fruits of all kinds; thus shall We bring forth the dead +that you may be mindful.

(Shakir, M.H.)

In this verse it is claimed that rain is a blessing from God. If one accepts this claim, because of arguments posited elsewhere, one understands rain as part of the teleology of life, in which the existence of living creatures depends on a system of signs each speaking of a conscious creativity.



Later, the geographical process of rainfall is explained. First, the stirrings of the air are a sign for impending rainfall: the wind promises the watering of the crops. Thus this is a time for happiness.

### **The Elevated Places, 7:58**

007.058 **From the land that is clean and good, by the will of its Cherisher, springs up produce, (rich) after its kind: but from the land that is bad, springs up nothing but that which is niggardly: thus do we explain the signs by various (symbols) to those who are grateful.**

(Ali, A. Yousuf)

7: 59. **And the good land-its vegetation comes forth plentifully by the command of its Lord; and that which is bad, its vegetation does not come forth but scantily. In like manner do WE expound the Signs in various forms for a people who are grateful.**

(Ali, M. Sher)

007.058 **As for the good land, its vegetation cometh forth by permission of its Lord; while as for that which is bad, only the useless cometh forth (from it). Thus do We recount the tokens for people who give thanks.**

(Pickthall, M.M.)

58. **And as for the good land, its vegetation springs forth (abundantly) by the permission of its Lord, and (as for that which is inferior (its herbage) comes forth but scantily; thus do We repeat the communications for a people who give thanks.**

(Shakir, M.H.)

In this verse the processes of erosion and deposition within a river are explained. Good land is that which is covered by river-deposited material (fertile soil). As the soil transported by river water comes from different regions of land, it carries a variety of soil particles, and it is this which contributes to the high fertility.

The soil which is not fertilised by river deposition is less fertile, although it can be irrigated by rivers or canals. However, the artificial production of this type of soil is not considered a match for the natural process.

#### **The Thunder, 13:4**

**13.004** 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!**

(Ali, A. Yousuf)

**13: 5.** And in the earth are diverse tracks, adjoining one another, and gardens of vines, and corn-fields, and date-palms, growing together from one root and others not so growing, they are all watered with the same water, yet WE make some of them excel others in fruit. **Therein are Signs for a people who use their understanding.**

(Ali, M. Sher)

**013.004** And in the Earth are neighbouring tracts, vineyards and ploughed lands, and date-palms, like and unlike, which are watered with one water. And we have made some of them to excel others in fruit. **Lo! herein verily are portents for people who have sense.**

(Pickthall, M. M.)

**4. And in the earth there are tracts side by side and gardens of grapes and corn and palm trees having one root and (others) having distinct roots-they are watered with one water, and We make some of them excel others in fruit; most surely there are signs in this for a people who understand.**

(Shakir, M. H.)

### **The Thunder, 13:17**

**013.017 He sends down water from the skies, and the channels flow, each according to its measure: But the torrent bears away to foam that mounts up to the surface. Even so, from that (ore) which they heat in the fire, to make ornaments or utensils therewith, there is a scum likewise. Thus doth God (by parables) show forth Truth and Vanity. For the scum disappears like forth cast out; while that which is for the good of mankind remains on the earth. Thus doth God set forth parables.**

(Ali, A. Yousuf)

**13: 18. HE sends down water from the sky so that the valleys flow according to their measure and the flood bears on its surface swelling foam. And from that which they heat in the fire, seeking to make ornaments or utensils, comes out a foam similar to it. Thus does ALLAH illustrate truth and falsehood. Now, as to the foam it goes away as rubbish and perishes but as to that which benefits men, it stays in the earth. Thus does ALLAH set forth parables.**

(Ali, M. Sher)

**013.017 He sendeth down water from the sky, so that valleys flow according to their measure, and the flood beareth (on its surface) swelling foam - from that which they smelt in the fire in order to make ornaments and tools riseth a foam like unto it - thus Allah coineth (the similitude of) the true and the false. Then, as for the foam, it passeth away as scum upon the banks, while, as for that which is of use to mankind, it remaineth in the earth. Thus Allah coineth the similitudes.**

(Pickthall, M. M.)

17. He sends down water from the cloud, then watercourses flow (with water) according to their measure, and the torrent bears along the swelling foam, and from what they melt in the fire for the sake of making ornaments or apparatus arises a scum like it; thus does Allah compare truth and falsehood; then as for the scum, it passes away as a worthless thing; and as for that which profits the people, it tarries in the earth; thus does Allah set forth parables.

(Shakir, M. H.)

**Ibrahim, 14:18**

014.018 The parable of those who reject their Lord is that their works are as ashes, on which the wind blows furiously on a tempestuous day: No power have they over aught that they have earned: that is the straying far, far (from the goal).

(Ali, A. Yousuf)

14: 19. The case of those who disbelieve in their Lord is that their works are like ashes, on which wind blows violently on a stormy day. They shall have no power over what they earn. That, indeed, is utter ruin.

Ali, M. Sher)

014.018 A similitude of those who disbelieve in their Lord: Their works are as ashes which the wind bloweth hard upon a stormy day. They have no control of aught that they have earned. That is the extreme failure.

(Pickthall, M. M.)

14 18. The parable of those who disbelieve in their Lord: their actions are like ashes on which the wind blows hard on a stormy day; they shall not have power over any thing out of what they have earned; this is the great error.

(Shakir, M. H.)

The meaning of these verses is similar to the meaning of verse no: 45 chapter no: 18-the cave. In this verse it is mentioned that light-weight material on the earth, like ash, is blown by the wind. Once the wind abates, the ash falls into rivers and onto the land. This process which transports the sediment is called 'transportation by wind'.

It is explained in geographical science that when high winds blow, they raise dust, soil, grass, leaves, and sometimes pebbles. This is the reason why dust-storms occur. When a dust-storm ceases, some of its materials are deposited on land and some into water. As to the sediment thrown by the wind into rivers, heavy materials are deposited onto the river bed, while light materials remain in suspension in the water; this partly explains the opacity of some river water. By wet-sieving analysis I also discovered that river water contains the light soil in suspension. According to Stocks's Law of particle settling, the light material takes time to settle and the heavy material settles comparatively sooner.

### **The Cave, 18:45**

18.045 Set forth to them the similitude of the life of this world: **It is like the rain which we send down from the skies: the earth's vegetation absorbs it, but soon it becomes dry stubble, which the winds do scatter: it is (only) God who prevails over all things.**

(Ali, A. Yousuf)

18: 46. **And set forth for them the similitude of the life of this world. It is like water which WE send down from the sky, and the vegetation of the earth is mingled with it, and then it becomes dry grass broken into pieces which the winds scatter, and ALLAH has full power over everything.**

(Ali, M. Sher)

018.045 **And coin for them the similitude of the life of the world as water which We send down from the sky, and the vegetation of the earth mingleth with it and then becometh dry twigs that the winds scatter. Allah is able to do all things.**

(Pickthall, M. M.)

45. **And set forth to them parable of the life of this world: like water which We send down from the cloud so the herbage of the earth becomes tangled on account of it, then it becomes dry broken into pieces which the winds scatter; and Allah is the holder of power over all things.**

(Shakir, M. H.)

It is mentioned in this verse that rain, once fallen onto the earth, dissolves soil, and mixes with leaves and grass. Then they flow with water in the rivers and, later, the river deposits this sediment elsewhere. This sediment after drying is converted into soil again which consists of both heavy and light particles. Lighter sediment can be blown off easily by wind. Sometimes it is scattered on the earth and sometimes it falls upon water again.

### **4.3 SEDIMENTATION**

Sediment is that which settles at the bottom of a liquid. Sedimentation is the process of particles settling in the liquid. Sedimentology is the study of sediments.

Sedimentation is a group of processes that are concerned with the transportation and deposition of the earth's material derived from different sources. Normally, sediment is originally created through the fragmentation of material due to the weathering of rocks. It is transported by water or air or is accumulated in beds by natural agencies.

The flow of a river is governed on the basis of hydrological laws. In the catchment area the geometry of the channel is influenced by the inflow of its runoff, its magnitude and the characteristics of the basin. Its geology and sediments are characteristics of the composition of its bed and bank material.

The estuary of the River Clyde is composed of different types of rock material. After disintegration and decomposition, different material becomes mixed up with the runoff. The material becomes mixed with river water in dissolved or suspended form. The products generally resulting from these processes are carbonates, clays, sand, boulders and gravel. Poor forest cover, lack of soil conservation and steep slopes generate a large amount of sediment. In this study of the river one can notice change in velocity and deposits at different places.

## ***CLASSIFICATION OF SEDIMENT***

The types of sediment transported by the River Clyde can be classified into two major groups which are as follows:-

1. Bed Load
11. Suspended Load

### **4.3.1. BED LOAD**

Bed load is that part of sediment which consists of particles rolling or sliding along the bottom of the stream bed. Bed load is present throughout the river channel. It has been observed that the river carries bed material to its maximum capacity during high discharge period. The movement of particles is a function of the river discharge. Flow value is determined by the direct measurement of the load.<sup>57</sup>

### **4.3.2. SUSPENDED LOAD**

Suspended load consists of particles of different sizes. Categorized as sand, silt and clay, these move without contact with the bed. The particles, being suspended by vertical components of the currents in turbulent water, are carried forward by horizontal components of these currents. Suspended load can be measured directly during the period of maximum flow. The quantities and properties of



suspended sediment at a particular station of a stream depend to a large extent upon the size and nature of the catchment area. The sediment discharge increases with the increase in water discharge. At high discharge the velocity of flow is great, with much turbulence in the flow. This increases the sediment—carrying capacity of the river, and the bed is scoured, and more sediment is picked up in suspension. The concentration of sediment is much higher at the bottom of the river than at the top.<sup>58</sup>

#### 4.4 PARTICLE SIZE ANALYSIS

##### The Thunder No. 13:4

**013.004** 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: 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!

(Ali, A. Yousuf)

This verse mentions that in each tract of land there are layers of soil in different constitution attached or adjacent to one another. We can see this fact on the land, and I present photographs to support this verse.

Further evidence of this hypothesis is that when a river flows, it does so over all types of soil tracts. Consequently, the soil grains are eroded and mixed with water from different regions and tracts. When the river deposits its sediments, there are various types of soil grains from various locations further up the river.

I discovered after dry-sieving analysis that the soil is a mixture of different types of grains, which did not come exclusively from one place but which originated from different tracts and regions of land. Three main agents are active to erode soil. They are water, air and glaciers. These agents also transport the sediment and deposit it. Air and wind role is limited to particular region, while the river plays an important role during its whole course.

In its first stage, at its youth, the river erodes the sediment from its bed and makes sharp v shaped valleys. In its second stage, at its maturity, it erodes its banks, makes u shaped valleys, and its main effect is transportation of the sediment. In its last stage, old age, it deposits its sediment, makes deltas and flows slowly into the ocean.<sup>59</sup>

The second part of the verse concerns differentiation's in soil quality: where all other variables are the same, such as rainfall, climate and temperature, the quality of crop production will vary according to the quality of the soil, and consequently, God in this way causes the fruit of some trees to be more delicious than that of others. Rainwater flows in different rivers. The whole land is irrigated by water from rain and river, but the fertility made by river-deposited sediment is crucial, as it determines the productivity of the land. Therefore, fruits which grow on more fertile land are more palatable. For example, the River Nile's valley in Egypt, and the River Sind's valley in Pakistan are renowned for their fertility.

The sediment I analysed was taken from the River Clyde's estuary. It contained different types of grains, showing that soil is composed of elements belonging to several regions or different places, just as the verse explains. Some of the grains are coarse-sand, silt and clay; some are fine—loess.

This process cannot be understood at first glance. But as it is mentioned in the verse "there are signs in this for people who have intelligence"; if someone tries to understand, close observation

reveals the scientific meaning of this verse as mentioned in the Qur'ān.

In Earth, Press and Siever state that:

The classification of sediments is based on mineralogy, texture, and chemical composition. The main criterion for subdivision of the detrital rocks is grain size, given as the diameter of the grain in millimeters. The boundaries are at 2 mm for gravel/sand, 1/16 mm for sand/silt, and 1/256 mm for silt/clay. The detritals are further moved by currents-look much like detrital rocks, and they are classed according to grain size in much the same way as the sands and muds.<sup>60</sup>

## 4.5 DRY-SIEVING METHOD

### *INTRODUCTION*

Particle size analysis by dry sieving separates particles greater than 62  $\mu\text{m}$  by sieving them in a sieve shaker for 30 minutes.

### *DRY-SIEVING*

Some sediment was taken from a sample collected at Ardmore Bay, Clyde Estuary. It was put into a mortar and mixed carefully. An empty plastic container was weighed on the balance and readings were noted of the weight. 50g of sediment was then put into the container and weighed. The 13 sieves were kept in order in the sieve shaker. The 50g of dry sediment was placed on the top sieve and it was shaken for 30 minutes. The following British Standard sieves were used.<sup>61</sup>

No.	Sieve Size
1	2.00mm
2	1.40mm
3	1.00mm
4	710 $\mu\text{m}$
5	500 $\mu\text{m}$
6	355 $\mu\text{m}$
7	250 $\mu\text{m}$
8	180 $\mu\text{m}$
9	125 $\mu\text{m}$
10	90 $\mu\text{m}$
11	63 $\mu\text{m}$
12	45 $\mu\text{m}$
13	<45 $\mu\text{m}$

After shaking for the specified time, the material on each individual sieve was finally transferred to a pre-weighed container using a sieve brush. Each container with sediment was weighed to the nearest 0.0001 g.

**TABLE NO. 1**

SAMPLE NO	BOAT WEIGHT	BOAT WT+ SEDIMENT	WT. OF SEDIMENT
1	1.6169	1.6169	0.0000
2	1.5278	1.5278	0.0000
3	1.5221	1.5351	0.0130
4	1.5231	1.5815	0.0584
5	1.5323	1.8136	0.2813
6	1.5258	2.2594	0.7336
7	1.5380	8.4444	6.9064
8	1.4981	12.9511	11.4530
9	1.5702	26.5812	25.0110
10	1.5417	6.6147	5.0730
11	1.5983	1.9959	0.3976
12	1.5432	1.5622	0.0190
13	1.6074	1.6116	0.0042

**FORMULA**

$$\frac{\text{wt. of sediment retained on sieve}}{\text{wt. of sediment retained on all sieves}} \times \frac{100}{1} = \%$$

$$\frac{00.0130}{49.9505} \times \frac{100}{1} = 0.026\%$$

With the help of the above formula the % weight on each sieve was calculated. This formula was applied in table No. 2

**TABLE NO. 2**

<b>Sieve size</b>	<b>Wt. sediment in each sieve (grams)</b>	<b>% Wt. in each sieve</b>	<b>Cumulative %</b>
2.00 mm	0.0000	0.000	0.000
1.40 mm	0.0000	0.000	0.000
1.00 mm	0.0130	0.026%	0.000
710 $\mu$ m	0.0584	0.117%	0.143
500 $\mu$ m	0.2813	0.563%	0.706
355 $\mu$ m	0.7336	1.469%	2.175
250 $\mu$ m	6.9064	13.826%	16.001
180 $\mu$ m	11.4530	22.929%	38.930
125 $\mu$ m	25.0110	50.071%	89.001
90 $\mu$ m	5.0730	10.156%	99.157
63 $\mu$ m	0.3976	0.796%	99.953
45 $\mu$ m	0.0190	0.038%	99.991
<45 $\mu$ m	0.0042	0.009%	100.00
	<b>49.9505</b>	<b>100%</b>	

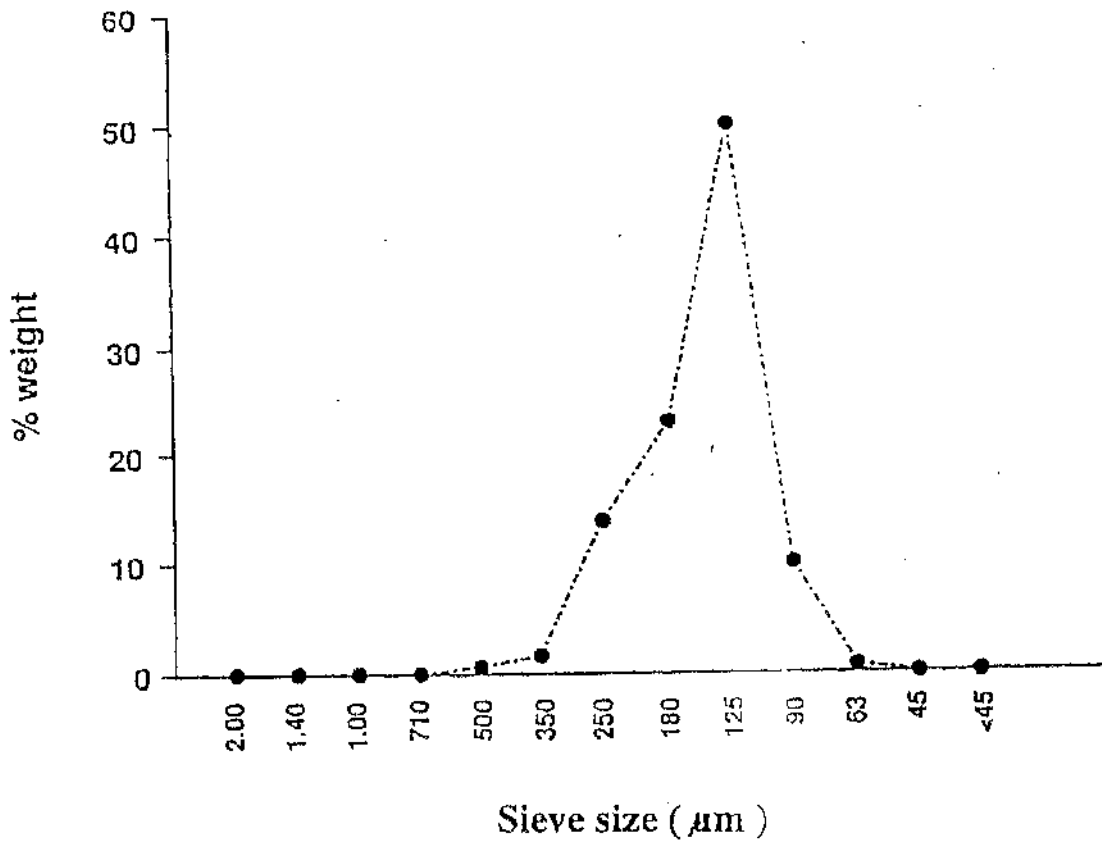
## ***RESULTS***

1. The most abundant particle size fraction is retained on the 125  $\mu\text{m}$  sieve
2. The vast majority of particles in this sample are greater than 125  $\mu\text{m}$  in diameter.
3. 38.93% > 125  $\mu\text{m}$ .
4. 11.00% < 125  $\mu\text{m}$ .
5. This result is also shown by a graph.

Later I carried out S.E.M. (Scanning Electron Microscopy) of the dry sieving analysis to see the shape and size of different materials contained in different sieve sizes.



### Particle size analysis (dry sieving)



1 mm = 1000 µm

#### **4.6 ELECTRON MICROSCOPY SCANNING OF THE PARTICLES**

To see the shape and size of the sediment contained in each sieve from 2 mm to 62 $\mu$ m, photographs of each sieve's material were taken and developed, so that measurement was feasible.

1. The sediment examined by S.E.M. (Scanning Electron Microscopy), showed that it was different in shape and size.
2. Most of the material was not round. Rather, it was still in rectangular form, which means that it had not been carried a long distance.
3. A close scanning showed marks of the weathering process on the particles.
4. The sediment clearly originated from different rock materials because particles of silt sand and clay were found in it.
5. The differences in the particles' shape, size and material could also be shown by photographs.

## 4.7 WET SIEVING METHOD

### The Thunder, 13:17

**17. He sends down water from the cloud, then water courses flow (with water) According to their measure, and the torrent bears along the swelling foam, and from what they melt in the fire for the sake of making ornaments or apparatus arises a scum like it; thus does Allah compare truth and falsehood; then as for the scum, it passes away as a worthless thing; and as for that which profits the people, it tarries in the earth; thus does Allah set forth parables.**

(Ali, A.Yousuf)

It is mentioned in this verse that God sends the rain from the sky. The rain water flows in streams and rivers. When it rains the surface soil dissolves in the rain water and begins to flow in the rivers. As Geographical Science tells us, when it rains the surface soil mixes with rain water. Due to this, the water colour changes and clear water appears muddy. This muddy water contains suspended material (sediment). When these suspended particles are carried in the river, some of them dissolve in water and consequently change colour. Some remain as foam and appear on the surface of the water.

As R. J. Rice (1988) points out, this suspended material has a 'load' which can be calculated:

Material is carried in suspension by the turbulent motion of flowing water in which the tendency of the particles to settle is offset by the residual upward momentum of the transporting medium. The water close to the river bed will normally be more heavily laden than that near the surface, so that samples taken from different parts of a stream cross-section will vary in the amount of sediment they contain....The suspension load is not simply a function of discharge but is affected by a wide range of other factors. Some of these are seasonal so that the amount of material carried at a specified discharge may differ in summer

and winter, others are related to the character of the precipitation, particularly its intensity and duration.<sup>62</sup>

The muddy water gradually becomes calm and clear, because the suspended sediment begins to be deposited on the river bed. Suspended sediment is composed of tiny particles of clay and loess. Soil remains in suspension for a long time. While the water remains in motion, it remains in suspension and some of the lighter part can be seen as a sort of foam. When the water becomes calm, the foam begins to disappear because the suspended particles begin to be deposited in the river bed. And the water, which is more useful when it becomes clean without suspended sediment, remains.

As Frank Press and Raymond Siever (1986) in discussing deep sea sedimentation indicate:

The general circulation of the ocean is too slow to accomplish much erosion, except where such strong currents as the Gulf Stream travel along the shallower edges of the sea. Slow-moving currents do have enough mild turbulence, however to keep fine-grained sedimentary particles suspended for a long time before they settle through the great depths of water to the bottom. Though sea water may look clear and transparent, careful filtering of large volumes of deep water, such as of 100-liter samples (about 25 gallons), can extract a few thousandths of a gram of suspended mineral solids....Just as oceanographers have long used the metaphor of a "rain" of particles from surface water to the bottom of the sea, they are now using the term "marine snow" to refer to the downward transport of extremely fine detritus, much of it bits of organic matter, to the bottom. How this material settles to the bottom in view of its small size and low density remains a mystery.<sup>63</sup>

My own observations fall into line with these recent discoveries. To give further scientific legitimation to the ideas contained within the Qur'ān, I decided to undertake a wet sieving (pipette) analysis. This experiment demonstrates that the finer material remains in suspension in rivers as suspended sediment. After some time it is deposited on the river bed by the process of sedimentation. After this, the river water becomes clean and clear.

The details of this analysis will be considered in the following section.

## 4.8 PIPETTE ANALYSIS:

### FULL ANALYSIS OF THE SILT-CLAY FRACTION

#### *INTRODUCTION*

Particle size analysis of sediment by dry sieving is only accurate for the coarser sand fraction down to 62  $\mu\text{m}$ . The very fine fraction below 62  $\mu\text{m}$  which is mainly silt and clay can be further analysed by sedimentation analysis. The principle of this technique is based on the settling rate of different sized particles through a water column. These different rates are calculated using Stokes's Law.<sup>64</sup>

#### *MATERIALS & METHOD*

Thirty grams of air-dried sediment were weighed to produce silt-clay fraction and placed in a litre beaker. Organic matter was removed by the addition of 100 ml of 6% hydrogen peroxide poured over it. It was then left overnight. The next morning, the sediment was heated gently with a bunsen burner and hydrogen peroxide was added drop wise until there was no further reaction. A filter paper was fixed in a Buchner funnel and the contents of the beaker poured onto the filter paper. The sediment was then washed under suction using a water pump with distilled water to remove any electrolytes. The sediment was washed from the filter paper into a beaker with distilled water and 10 ml of sodium hexameta phosphate solution was added to the beaker and stirred for 15 minutes. The mixture was again left to soak overnight.

The next morning the sediment was stirred again for 15 minutes and then transferred to the surface of a 62  $\mu\text{m}$  sieve placed in a white

basin. 400 ml of distilled water was added to flood the sieve surface. The wet sediment was then collected in the basin until most of the fine material had passed through. The sieve was lifted and allowed to drain over the white basin. The sediment was put into an oven at 100°C to dry.

After drying, the 62  $\mu\text{m}$  sieve containing the sediment was placed over a white enamel tray and shaken. Any particles which passed through the sieve into the tray were transferred to the white basin. After this the remaining sediment was transferred to the coarsest of a series of dry sieves from 710  $\mu\text{m}$  to 62  $\mu\text{m}$  + pan.

Dry sieving was carried out on an Octagon automatic sieve shaker for a period of 15 minutes. Any material which collected in the pan was added to the contents of the white basin. The remaining sand fractions, > 62  $\mu\text{m}$ , were added together and stored for later use. The material in the white basin was used for the pipette analysis as follows:

The <62  $\mu\text{m}$  sediment and distilled water was poured into a beaker and the contents washed off the white basin into the beaker with the help of distilled water. Then the mixture was poured again into a 1000 ml stopper measuring cylinder. The beaker was again rinsed with distilled water into a measuring cylinder. The total volume of sediment and distilled water in the cylinder was 1000 ml. Then the mixture was ready for pipette samples.

The first pipette sample was withdrawn immediately by putting a 20 ml bulb pipette into the cylinder at the depth of 20 cm and sucking

out the sample with the aid of a rubber bulb. The pipette sample was transferred into an aluminium weighed dish and dried in the oven at 100 °C.

After 7 minutes 44 seconds, the second pipette sample was taken from a depth of exactly 10 cm below the surface of the suspension. This 20 ml sample was transferred to a weighed aluminium dish and dried at 100 °C.

By adopting this method the third pipette sample was taken after a time interval of 2 hours and 3 minutes.

After the 3 pipette samples were dried and their weight noted, a table was made of the readings, and the results were calculated. After the calculation a results table was drawn up. Finally, the table of results was graphically and theoretically explained.

Adopting the same method I did 3 more analyses. The results are presented in the same table and also in same graph showing as replicate numbers.



## SEDIMENT WEIGHTS FROM PIPETTE ANALYSES

**TABLE NO. 1**

Smple No	Replicate No	Wt.empty dish	Wt.of Sediment + empty dish	Wt. of Sediment from 20 ml
1 Pipette Sample 62 um Time 0:0	1	1.5231	1.5299	0.0068
	2	1.5432	1.5519	0.0087
	3	1.5065	1.5171	0.0106
	4	1.3860	1.3973	0.0113
				0.0374
				9.35
2 Pipette Sample < 15.6 um Time 7:44 m.s	1	1.5323	1.5380	0.0057
	2	1.6074	1.6125	0.0051
	3	1.4107	1.4167	0.0060
	4	1.3741	1.3803	0.0062
				0.023
				5.75
3 Pipette Sample < 3.9 um Time 2:03 hrs:mins 0.013	1	1.4981	1.4982	0.0001
	2	1.3790	1.3832	0.0042
	3	1.4073	1.4117	0.0044
	4	1.3749	1.3792	0.0043
				3.5

This table represents the results of 4 pipette analyses

### *EXPLANATION OF TABLE No. 1*

According to the table, all the sediment which is  $<62 \mu\text{m}$  is found in the 1st. pipette sample. The 1st. pipette sample has the most fraction.

The second pipette sample ( $<15.6 \mu\text{m}$ ) has more fraction than the third pipette sample, and has less fraction than the first pipette sample. The first pipette sample was taken immediately so that the particles of the sediment were suspended in the water and had not settled; therefore, the amount is high. However, the second pipette sample was taken after 7 min. 44 sec, so some particles had begun to settle. Therefore, the fraction is less than the first pipette sample.

The third pipette sample is  $<3.9 \mu\text{m}$ . It has less fraction because this sample was taken after a time interval of 2 hr 3 min. In this period most of the sediment particles had settled, so the sediment suspension was less and the fraction was less.

Due to the large amount of variation between replicate samples at the highest fraction ( $<62 \mu\text{m}$ ) a mean or average value was calculated for each set of replicates at each size fraction.

The following mean weights were recorded: 9.35, 5.75 and 3.5 grams of sediment for the  $<62 \mu\text{m}$ ,  $<15.6 \mu\text{m}$  and  $<3.9 \mu\text{m}$  fractions respectively.

### ***DESCRIPTION OF THE GRAPH***

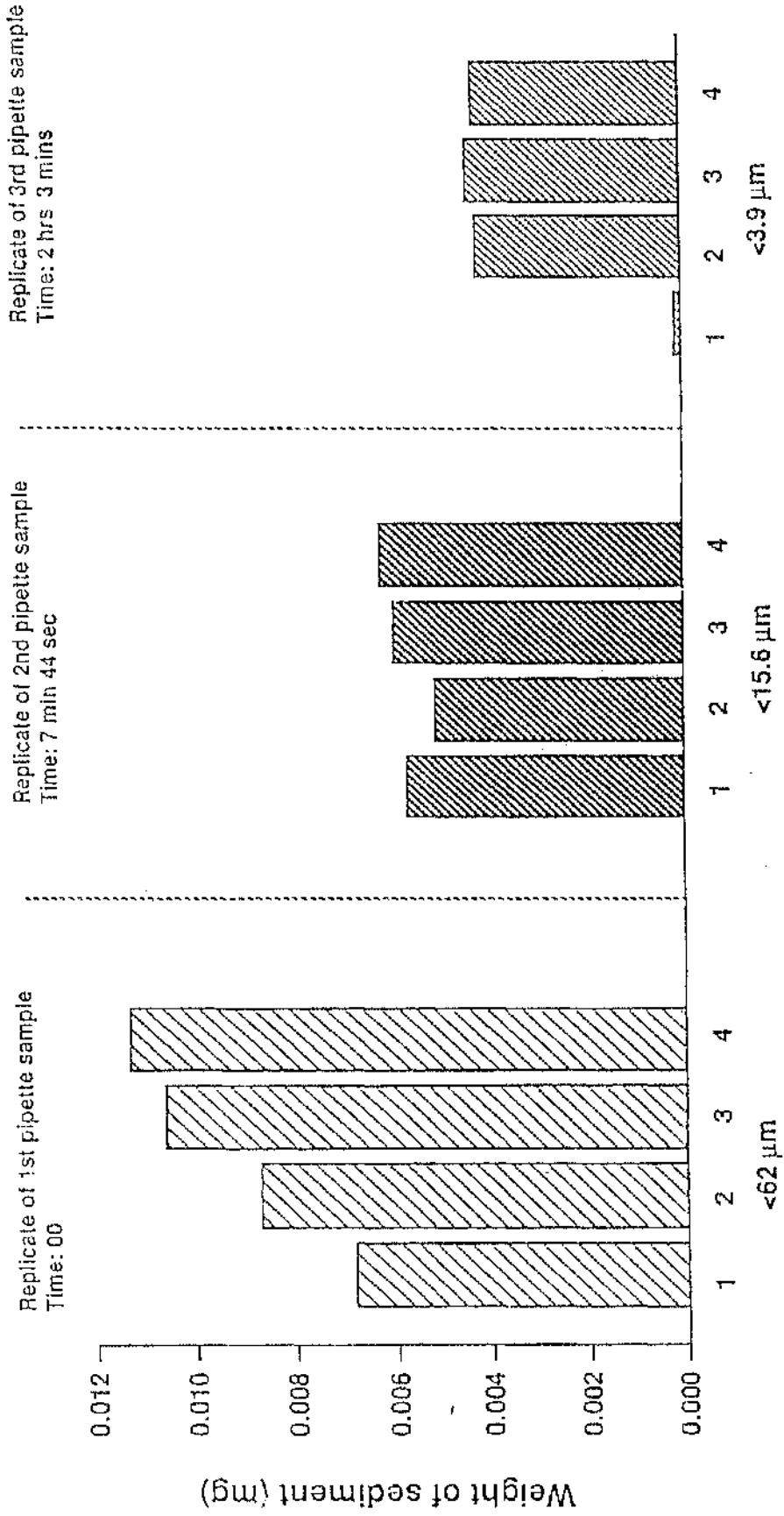
In order to present the results in graphical form the sediment weight was first converted from grams to milligrams by multiplying by 1000.

There are three separate histograms to show the three separate pipette samples. These three pipette samples represent the three fine fractions of the silt-clay samples. The individual areas within each histogram are replicate samples at a particular fraction. Therefore, the weight of the sediment of each replicate should be expected to be the same. However in the  $<62 \mu\text{m}$  fraction there is a large difference between the first and last replicates. Similarly, there is a difference between replicates within the  $<15.6 \mu\text{m}$  fraction. But here the differences are not so great as in the  $<62 \mu\text{m}$  fraction.

In the third sample which represents the very fine clay fraction, replicates 2 to 4 are very similar in weight. Replicate No. 1 shows a much smaller weight and therefore a much larger difference than the other three.

# Pipette analysis replicate fraction weights

Vol. of sample = 20 ml



Pipette samples

## Pipette Sample Analysis Final Result

TABLE NO. 2

No.of Analysis	Wt.<62 $\mu\text{m}$	Wt.<62 $\mu\text{m}$ >15.6 $\mu\text{m}$	Wt.<15.6 $\mu\text{m}$	Wt.<15.6 $\mu\text{m}$ > 3.9 $\mu\text{m}$	Wt.<3.9 $\mu\text{m}$
	1		2		3
1	3.4	0.55	2.85	2.8	0.05
2	4.35	1.80	2.55	0.45	2.10
3	5.3	2.3	3.00	0.8	2.2
4	5.65	2.55	3.10	0.40	2.15

### *EXPLANATION OF TABLE NO. 2*

This table shows four types of complete analysis, each analysis having three pipette sample results.

1, 2 and 3 are pipette samples in each analysis, while wt. means weight in grams in each pipette sample.

This table also corroborates the Wentworth grade scale, computed from Stokes's Law, that heavy particles settle sooner and fine particles settle later.

## *DESCRIPTION OF THE RESULTS BY GRAPHS*

The sediment weights in table 2 which have been previously calculated are presented in this graph. The numbers along the X axis represent the three pipette samples while the y axis represents the wt. of sediment in milli-grams.

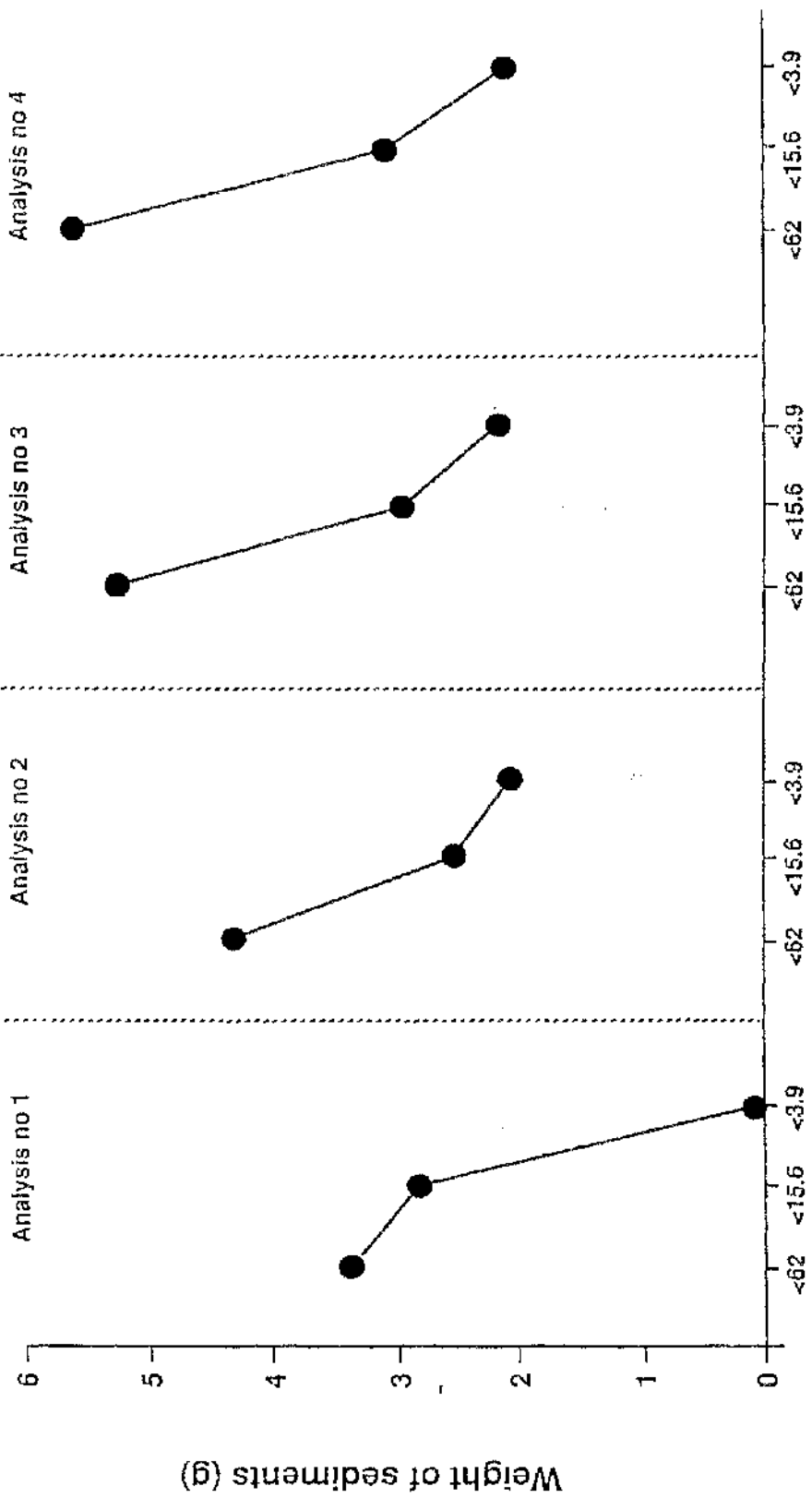
This big graph shows 4 small graphs. Each small graph represents one complete analysis, and every analysis is different from the other. While three of the four graphs are very similar in shape, the first graph is quite different. This is because the first replicate of the third pipette sample is much smaller than the other three replicates in this fraction.

It can be seen from the results that the mean weight of sediment decreases with a corresponding decrease in the size of fraction. In other words, wt. of sediment ( $<62 \mu\text{m}$ )  $>$  wt. of sediment ( $<15.6$ )  $>$  wt. of sediment ( $<3.9\mu\text{m}$ ).

According to the Wentworth grade scale which gives times of settling of particles which have been calculated using Stokes's Law, larger particles will fall more rapidly than small particles in a given time. Therefore, the first pipette sample representing the  $>62 \mu\text{m}$  fraction will contain a representative sample of all particles from  $62 \mu\text{m}$  to  $1 \mu\text{m}$ . The second pipette sample will contain only particles from  $15.6$  to  $1 \mu\text{m}$  and the third sample will have only those particles from  $3.9 \mu\text{m}$  to  $1 \mu\text{m}$ .

Total analysis of fine fraction <math><62 \mu\text{m}</math> by sedimentation

Volume of sample = 20 ml x 50 = 1000 ml



Pipette samples

On this basis it should be expected that the weight of sediment will decrease from the first to the third pipette sample and this is indeed what the results show in each small graph.

### ***CONCLUSION OF THIS ANALYSIS***

As is shown by these results, the sedimentation technique gives a full breakdown of the silt/clay fraction. When this technique is used in conjunction with the dry sieving analysis, a complete picture of the distribution of particle size emerges.

In support of Qur'ān 13:17, Stokes's law of particle settling was confirmed. It is shown that heavy particles settle sooner and light particles take time to settle.



## 4.9 PHYSICAL SEDIMENTATION

### STOKES'S LAW OF PARTICLE SETTLING

#### *INTRODUCTION*

According to Stokes's Law of particle settling, particles of different size take different times for settling.<sup>65</sup>

In this experiment it is discovered after analysis that the times of settling of particles with varying diameters differ in glycerol and in a 50% water/50% glycerol mixture.

The weight-force driving the motion of a grain is equal to the particle weight. By the principle of Archimedes, the weight of the fluid is displaced. That is:

$$\text{Weight force} = \frac{4}{3} \pi \frac{D^3}{2} (\rho - p) g \text{ N}$$

Where D is the particle diameter,  $\rho$  the solid density of the particle, P the fluid density and g the acceleration due to gravity.<sup>66</sup>

I observed that the particles tended to settle steadily, after a short initial period of acceleration. According to Newton's first law, each grain is also operated on by a force equal and opposite to its downward acting weight. This force is the drag afforded by the fluid.

### ***APPARATUS AND MATERIALS***

A one litre measuring cylinder, stop watch, thermometer and metre stick, a quantity of very coarse quartz sand rich in granules and small pebbles, Watch glasses, Caliper gauge, Glycerol, and Stirring rods.

### ***METHOD***

The sand was spread on a paper. Ten grains were selected ranging between about 1 and 10 millimetres in diameter. Each particle was placed on a separate watch glass. The gauge was used to measure the average diameter of each grain which were as follows:

**TABLE**

<b>No. of Grains</b>	<b>Grain Diameter</b>
1	7 mm
2	8 mm
3	10 mm
4	10 mm
5	8 mm
6	6 mm
7	7 mm
8	10 mm
9	6 mm
10	10 mm

The cylinder was filled almost to the top with glycerol and any air bubbles were allowed to separate out. A horizontal line was marked on the outside of the cylinder about one third of the way down from the top. The height of the column of glycerol was measured up to the level of this mark. The temperature of 18°C was noted. Alternate grains were released from the series one by one into the glycerol and the time of their descent between the mark and the bottom of the cylinder was as follows.

**First Experiment in Glycerol**

TABLE NO. 2

No. of Grains	Grain Size in mm	Grains Descended Time in Seconds
1	7	0:17.84
2	8	0:20.19
3	10	0:14.40
4	10	0:11.08
5	8	0:21.06

The temperature of the glycerol was checked again. It was 22°C. For the second part of the experiment, half of the glycerol was poured away and the remaining volume was measured. A measured volume of water roughly equal to the glycerol removed was poured

into the cylinder. The mixture was stirred thoroughly and its temperature was measured. The experiment was repeated using the remaining quartz grains.

**2nd Experiment 1/2 Glycerol & 1/2 Water**

TABLE NO. 3

No. of grains.	Grains size in mm	Grains descended time in seconds
6	6	0: 6.78
7	7	0:11.93
8	10	0: 6.38
9	6	0: 8.28
10	10	0: 4.94

This calculation was read from the descending time, and the height of the glycerol column and the particle terminal settling velocity, by using Stokes's equation.<sup>67</sup>

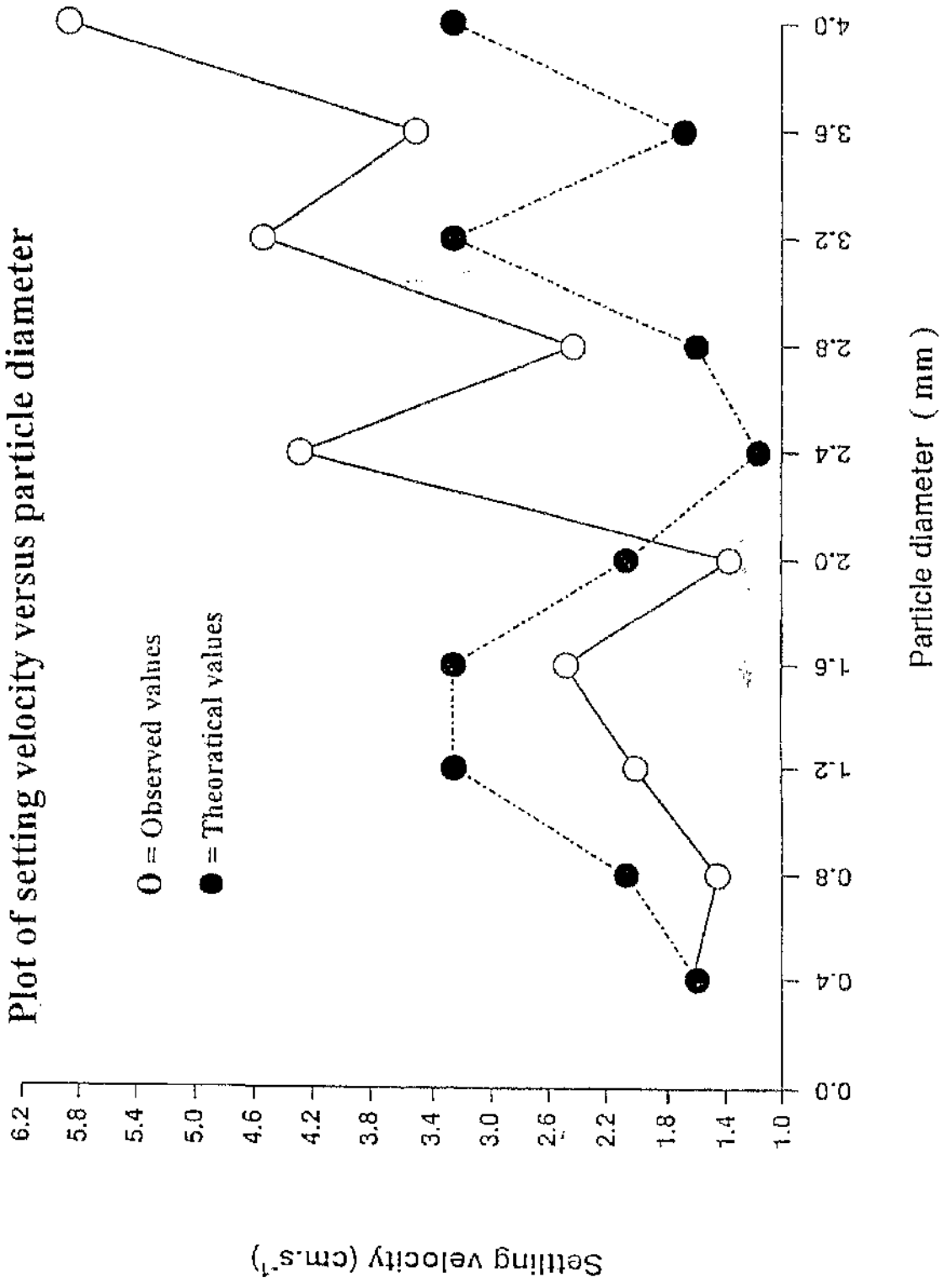
$$U = \frac{1}{18} \frac{(O-p) g D^2}{n} \text{ m s}^{-1}$$

The calculated results were plotted on log—log graph paper. The axes were settling velocity and particle diameter.

### TABLE OF RESULTS

Grain diameter in meters	Observed values ( cm.s-1 )	Theoretical values ( cm.s-1 )
0.007	1.626	1.592
0.008	1.436	2.079
0.01	2.014	3.249
0.01	2.483	3.249
0.008	1.377	1.170
0.007	2.431	1.592
0.01	4.545	3.249
0.006	3.502	1.670
0.01	5.870	3.249

Plot of setting velocity versus particle diameter



### ***SUMMARY OF THIS ANALYSIS***

Glycerol is more dense than water/Glycerol mixture. Therefore the grains fall more quickly in W/G mixture than in Glycerol. The grains exist in the gravity field and sink because in both cases they are more dense than the fluid.

Some floating material is light and remains in suspension in the form of foam. When the water becomes calm, it settles at the bottom of the liquid. This fact is explained in Qur'ān 13:17.

### ***SUMMARY OF ALL ANALYSES***

Particle size analysis is the most important study in this research. I worked on this research in four ways.

- A Dry-Sieving analysis represents particle size analysis  $>62 \mu\text{m}$ .
- B Pipette analysis shows particle size analysis  $<62 \mu\text{m}$ .
- C S.E.M. explains the shape, size and material of the particles.
- D Stokes's Law tells us about the settling time of particles.

#### 4.10 CONCLUSION

Through a knowledge of geographical science and geological information we come to know that sediment eroded by rainfall is transported by rivers and winds in plains areas and deposited in different places, especially in river estuaries.

By sediment analysis I observed that there are different types of soil deposited in sediment. The sediment which is transported and deposited by rivers contains different kinds of soil.

In this chapter I have studied different verses of the Holy Qur'ān which explain erosion by rain water, different types of land (which means different types of soil), suspension of sediment in river water, and deposition of sediment on the river bed.

The Qur'anic verses contain knowledge of erosion by rain water, transportation and deposition; also, concepts of different types of land and soil, and suspension of sediment in water and sedimentation are included in the Holy Qur'ān.

Rainfall is clearly part of a larger process. The ecology of the planet is not sustained by rainfall alone but is also supplemented by the processes whereby the fertile lands of the earth are enriched by the soils which wash down from the high grounds on to the coastal plains and valleys in which mankind reaps his harvest of fruit and crops. Agricultural production as such will be the topic of the fifth chapter. While bearing in mind that Sedimentation is an isolatable process which for the purposes of science, may be studied as an entity in itself, we should also remember that the whole contains the



part. The wisdom of the Qur'ān consists in a recognition of the complete cycle, indivisible from the purposes with which it has been invested: that is the benevolent creation of a system amenable to the human creatures which live within it. The distribution of the optimum types and quantities of particles to the crop lands of the earth, by the process of sedimentation, attests to this wisdom.

#### 4.11 REFERENCES

57. Rice, J.R, Fundamentals of Geomorphology, New York, 1988, .
58. Ibid., pp
59. Thornbury, D. William, Principles of Geomorphology, Delhi, 1993, 86.
60. Press, F. & Siever, R., Earth, (4th ed.), New York, 1984, 75.
61. Leeder, M.R., Sedimentology: Process and Product, London, 1988, 35-75 & 171-194.
62. Rice, op. cit., pp
63. Press, op.cit.,76.
64. Buchanan, J.B., "Sediment Analysis", in Methods for the Study of Marine Benthos, Holme, N.A.& McIntyre, A.D., (eds.), Oxford, 1984, 41.
65. Allen, J.R.L., Experiments in Physical Sedimentology, London, 1985, 26.
66. Ibid., 55.
67. Ibid., 63.

**CHAPTER NO: 5**  
**PLANT PRODUCTION**

**6.099**

It is He Who sendeth down rain from the skies: with it We produce vegetation of all kinds: from some We produce green (crops), out of which We produce grain, heaped up (at harvest); out of the date-palm and its sheaths (or spathes) (come) clusters of dates hanging low and near: and (then there are) gardens of grapes, and olives, and pomegranates, each similar (in kind) yet different (in variety): when they begin to bear fruit, feast your eyes with the fruit and the ripeness thereof Behold! in these things there are signs for people who believe.

Ali, A. Yousuf

## 5.1 INTRODUCTION

In chapter three Qur'anic verses that explain scientifically the effect of rainfall on soil erosion and deposition were cited. In this chapter the verses describe and explain the effect of rainfall on plant production.

The Qur'ān describes in great detail the wonders of the plant world and how it depends on water. The verses explain the process whereby a barren land is transformed into a fertile one, rich in every form of plant life, due to the action of rainfall.

5. O people! if you are in doubt about the raising, then surely We created you from dust, then from a small seed, then from a clot, then from a lump of flesh, complete in make and incomplete, that We may make clear to you; and We cause what We please to stay in the wombs till an appointed time, then We bring you forth as babies, then that you may attain your maturity; and of you is he who is caused to die, and of you is he who is brought back to the worst part of life, so that after having knowledge he does not know anything; **and you see the earth sterile land, but when We send down on it the water, it stirs and swells and brings forth of every kind a beautiful herbage.**

(22:5)

The variety of fruits and other crops is maintained within the structure of an ecological system exemplifying a strict balance and fixed pattern. The diversity exists as a function of an underlying unity displaying the order prescribed by God.

We can see an example of this ecology in the working of photosynthesis and respiration. Plants absorb nitrogen and carbon dioxide and give out oxygen. To balance this process, humans and

animals breathe in oxygen and breathe out carbon dioxide, so the cycle is completed.

**49. Surely We have created everything according to a measure.**

(54:49)

Again, God refers to His many signs for the people in the growth of various kinds of fruit and crops which are watered by the same water but possess different colours, tastes and flavours:

**4. And in the earth there are tracts side by side and gardens of grapes and corn and palm trees having one root and (others) having distinct roots they are watered with one water, and We make some of them excel others in fruit; most surely there are signs in this for a people who understand.**

(13:4)

"Then the Qur'an draws man's attention to the amazing process of reproduction in the vegetable kingdom. But it refers only to the sexual process of reproduction without mentioning the other type i.e., the asexual process of reproduction. This is because the former is the biological process whose purpose is the appearance of a new individual identical to the one that gave it birth, where as the latter is not really reproduction at all but mere multiplication".<sup>68</sup>

**53. Who made the earth for you an expanse and made for you therein paths and sent down water from the cloud; then thereby We have brought forth many species of various herbs.**

(20:53)

In Surat Luqmān (31), we read:

**10. He created the heavens without pillars as you see them, and put mountains upon the earth lest it might convulse with you, and He spread in it animals of every kind; and We sent down water from the cloud, then caused to grow therein (vegetation) of every noble kind.**

(31:10)

The reproductive process reaches its peak with the germination of seeds. The Qur'ān refers to this marvel of God's in the world of vegetation in these words:

**95. Surely Allah causes the seed grain and the stone to germinate; He brings forth the living from the dead and He is the brings forth of the dead from the living; that is Allah! how are you then turned away.**

(6:95)

The Qur'ān is full of scientific facts, yet men only understand them according to their capacity for knowledge and understanding. All fields of science are represented, and particular experts appreciate the science in their own field, whether that is geography, geology, astronomy or botany.

These examples in the world of science help to increase man's belief and faith in God and His creative power. The Qur'ān mentions these wonderful facts of life to bring home to man the grandeur and majesty of the Creator.

## 5.2 SCIENTIFIC INTERPRETATION OF 92 QUR'ANIC VERSES

Those verses which contain the scientific facts of our discussion in this chapter are printed in bold type.

Interpretation by Four Qur'anic Scholars

### The Thunder, 13:3

013.003 And it is He who spread out the earth, and set thereon mountains standing firm and (flowing) rivers: **and fruit of every kind He made in pairs, two and two:** He draweth the night as a veil o'er the Day. Behold, verily in these things there are signs for those who consider!

(Ali, A. Yousuf)

13: 4. And HE it is Who spread out the earth and made therein mountains and rivers, and of fruits of every kind **HE made therein two sexes.** HE causes the night to cover the day. Therein, verily, are Signs for a people who reflect.

(Ali, M. Sher)

013.003 And He it is Who spread out the earth and placed therein firm hills and flowing streams, **and of all fruits He placed therein two spouses (male and female).** He covereth the night with the day. Lo! herein verily are portents for people who take thought.

(Pickthall, M. M.)

3. And He it is Who spread the earth and made in it firm mountains and rivers, **and of all fruits He has made in it two kinds;** He makes the night cover the day; most surely there are signs in this for a people who reflect.

(Shakir, M. H.)



### **Taha, 20:53**

020.053 "He Who has, made for you the earth like a carpet spread out; has enabled you to go about therein by roads (and channels); and has sent down water from the sky." With it have We produced diverse pairs of plants each separate from the others.

(Ali, A. Yousuf)

20: 54. It is HE WHO has made the earth for you a bed and has caused pathways for you to run through it; and WHO sends down rain from the sky and thereby WE bring forth various kinds of vegetation in pairs.

(Ali, M. Sher)

020.053 Who hath appointed the earth as a bed and hath threaded roads for you therein and hath sent down water from the sky and thereby We have brought forth divers kinds of vegetation,

(Pickthall, M. M.)

53. Who made the earth for you an expanse and made for you therein paths and sent down water from the cloud; then thereby We have brought forth many species of various herbs.

(Shakir, M. H.)

### **The Pilgrimage, 22:5**

022.005 O mankind! if ye have a doubt about the Resurrection, (consider) that We created you out of dust, then out of sperm, then out of a leech-like clot, then out of a morsel of flesh, partly formed and partly unformed, in order that We may manifest (our power) to you; and We cause whom We will to rest in the wombs for an appointed term, then do We bring you out as babes, then (foster you) that ye may reach your age of full strength; and some of you are called to die, and some are sent back to the feeblest old age, so that they know nothing after having known (much), and (further), thou seest the earth barren and lifeless, but when We pour down rain on it, it is stirred (to life), it swells, and it puts forth every kind of beautiful growth (in pairs).

(Ali, A. Yousuf)

22: 6.O people, if you are in doubt concerning the Resurrection, then consider that WE have indeed created you from dust, then from a sperm drop, then from clotted blood, then from a lump of flesh, partly formed and partly unformed, in order that WE make Our power manifest to you. And WE cause what WE will to remain in the wombs for an appointed term; then WE bring you forth as babes; then WE rear you that you may attain to your age of full strength. And there are some of you who are caused to die in the normal course, and there are others among you are kept back till the worst part of life with the result that they know nothing after having had knowledge. And thou seest the earth lifeless, **but when WE send down water thereon it stirs and swells and grows every kind of beauteous vegetation.**

(Ali, M. Sher)

022.005 O mankind! if ye are in doubt concerning the Resurrection, then lo! We have created you from dust, then from a drop of seed, then from a clot, then from a little lump of flesh shapely and shapeless, that We may make (it) clear for you. And We cause what We will to remain in the wombs for an appointed time, and afterward We bring you forth as infants, then (give you growth) that ye attain your full strength. And among you there is he who dieth (young), and among you there is he who is brought back to the most abject time of life, so that, after knowledge, he knoweth naught. And thou (Muhammad) seest the earth barren, **but when We send down water thereon, it doth thrill and swell and put forth every lovely kind (of growth).**

(Pickthall, M. M.)

5. O people! if you are in doubt about the raising, then surely We created you from dust, then from a small seed, then from a clot, then from a lump of flesh, complete in make and incomplete, that We may make clear to you; and We cause what We please to stay in the wombs till an appointed time, then We bring you forth as babies, then that you may attain your maturity; and of you is he who is caused to die, and of you is he who is brought back to the worst part of life, so that after having knowledge he does not know anything; and you see the earth sterile land, **but when We send down on it the water, it stirs and swells and brings forth of every kind a beautiful herbage.**

(Shakir, M. H.)

**The Poets, 26:7**

**026.007 Do they not look at the earth,- how many noble things of all kinds We have produced therein?**

(Ali, A. Yousuf)

**26: 8. See they not the earth, how many of every noble species have WE caused to grow therein ?**

(Ali, M. Sher)

**026.007 Have they not seen the earth, how much of every fruitful kind We make to grow therein ?**

(Pickthall, M. M.)

**7. Do they not see the earth, how many of every noble kind We have caused to grow in it?**

(Shakir, M. H.)

**Luqman, 31:10**

**031.010 He created the heavens without any pillars that ye can see; He set on the earth mountains standing firm, lest it should shake with you; and He scattered through it beasts of all kinds. We send down rain from the sky, and produce on the earth every kind of noble creature, in pairs.**

(Ali, A. Yousuf)

**31: 11. HE has created the heavens without any pillars that you can see, and HE has placed in the earth firm mountains that it may not quake with you, and HE has spread therein all kinds of creatures; and WE have sent down water from the clouds, and have caused to grow therein of every fine species.**

(Ali, M. Sher)

031.010 He hath created the heavens without supports that ye can see, and hath cast into the earth firm hills, so that it quake not with you; and He hath dispersed therein all kinds of beasts. **And We send down water from the sky and We cause (plants) of every goodly kind to grow therein.**

(Pickthall, M. M.)

10. He created the heavens without pillars as you see them, and put mountains upon the earth lest it might convulse with you, and He spread in it animals of every kind; **and We sent down water from the cloud, then caused to grow therein (vegetation) of every noble kind.**

(Shakir, M. H.)

### **Yasin, 36:36**

**036.036 Glory to God, Who created in pairs all things that the earth produces, as well as their own (human) kind and (other) things of which they have no knowledge.**

(Ali, A. Yousuf)

**36: 37. Holy is HE Who created all things in pairs, of what the earth grow and of themselves, and of what they know not.**

(Ali, M. Sher)

**036.036 Glory be to Him Who created all the sexual pairs, of that which the earth groweth, and of themselves, and of that which they know not!**

(Pickthall, M. M.)

**36. Glory be to Him Who created pairs of all things, of what the earth grows, and of their kind and of what they do not know.**

(Shakir, M. H.)

**The Scatterers, 51:49**

**051.049 And of every thing We have created pairs: That ye may ceive instruction.**

(Ali, A. Yousuf)

**51: 50. And of everything have WE created pairs that you may reflect.**

(Ali, M. Sher)

**051.049 And all things We have created by pairs, that haply ye may reflect.**

(Pickthall, M. M.)

**49. And of everything We have created pairs that you may be mindful.**

(Shakir, M. H.)

These verses contain one important scientific fact. That is, there are two kinds of flowers, male and female. This agrees with what modern science has found out.

**The Rock, 15:22**

**015.022 And We send the fecundating winds, then cause the rain to descend from the sky, therewith providing you with water (in abundance), though ye are not the guardians of its stores.**

(Ali, A. Yousuf)

**15: 23. And WE send fecundating winds, then WE send down water from the clouds, then WE give it to you to drink, and you could not yourselves store it.**

(Ali, M. Sher)

**015.022 And We send the winds fertilising, and cause water to descend from the sky, and give it you to drink. It is not ye who are the holders of the store thereof.**

(Pickthall, M. M.)

**22. And We send the winds fertilizing, then send down water from the cloud so We give it to you to drink of, nor is it you who store it up.**

(Shakir, M. H.)

### **The Scatterers, 51:1-5**

**051.001 By the (Winds) that scatter broadcast;**

**051.002 And those that lift and bear away heavy weights;**

051.003 And those that flow with ease and gentleness;

**051.004 And those that distribute and apportion by Command;-**

051.005 Verily that which ye are promised is true;

(Ali, A. Yousuf)

**51: 2. By those that scatter with a true scattering,**

**51: 3. Then carry the load,**

51: 4. Then speed lightly along,

**51: 5. And then distribute by Our command,**

51: 6. Surely, that which you are promised is true,

(Ali, M. Sher)

**051.001 By those that winnow with a winnowing**

**051.002 And those that bear the burden (of the rain)**

051.003 And those that glide with ease (upon the sea)

**051.004 And those who distribute (blessings) by command,**

051.005 Lo! that wherewith ye are threatened is indeed true,

(Pickthall, M. M.)

1. I swear by the wind that scatters far and wide,
2. Then those clouds bearing the load (of minute things in space).
3. Then those (ships) that glide easily,
4. Then those (angels who) distribute blessings by Our command;
5. What you are threatened with is most surely true,

(Shakir, M. H.)

Wind is an important factor in dispersing the seeds and in pollination. This is the reason why plants are present even where the effort of man is not present. This important scientific fact appears present in the above verses.

### **The Cow, 2:264, 266**

002.264 O ye who believe! cancel not your charity by reminders of your generosity or by injury,- like those who spend their substance to be seen of men, but believe neither in God nor in the Last Day. They are in parable like a hard, barren rock, on which is a little soil: on it falls heavy rain, which leaves it (Just) a bare stone. They will be able to do nothing with aught they have earned. And God guideth not those who reject faith.

002.266 Does any of you wish that he should have a garden with date-palms and vines and streams flowing underneath, and all kinds of fruit, while he is stricken with old age, and his children are not strong (enough to look after themselves)- **that it should be caught in a whirlwind, with fire therein, and be burnt up? Thus doth God make clear to you (His) Signs; that ye may consider.**

(Ali, A. Yousuf)

2:265. O ye who believe ! render not vain your alms by reproach and injury like him who spends his wealth to be seen by men, and he believes not in ALLAH and the Last Day. **His case is like the case of a smooth rock covered with earth, on which heavy rain falls, leaving it bare and hard,** They shall not secure aught of what they earn. And ALLAH guides not the disbelieving people.

2:267. Would any of you desire that there should be for him a garden of palm trees and vines with streams flowing beneath it, and with all kinds of fruit for him therein-while old age has stricken him and he has weak offspring-**and that a fiery whirlwind should smite it and it be all burnt ? Thus does ALLAH makes HIS Signs clear to you that you may reflect.**

(Ali, M. Sher)

002.264 O ye who believe! Render not vain your almsgiving by reproach and injury, like him who spendeth his wealth only to be seen of men and believeth not in Allah and the Last Day. **His likeness is as the likeness of a rock whereon is dust of earth; a rainstorm smiteth it, leaving it smooth and bare.** They have no control of aught of that which they have gained. Allah guideth not the disbelieving folk.

002.266 Would any of you like to have a garden of palm-trees and vines, with rivers flowing underneath it, with all kinds of fruit for him therein; and old age hath stricken him and he hath feeble offspring; **and a fiery whirlwind striketh it and it is (all) consumed by fire.** Thus Allah maketh plain His revelations unto you, in order that ye may give thought.

(Pickthall, M. M.)



264. O you who believe! do not make your charity worthless by reproach and injury, like him who spends his property to be seen of men and does not believe in Allah and the last day; so his parable is as **the parable of a smooth rock with earth upon it, then a heavy rain falls upon it, so it leaves it bare; they shall not be able to gain anything of what they have earned; and Allah does not guide the unbelieving people.**

266. Does one of you like that he should have a garden of palms and vines with streams flowing beneath it; he has in it all kinds of fruits; and old age has overtaken him and he has weak offspring, when, (lo!) **a whirlwind with fire in it smites it so it becomes blasted; thus Allah makes the communications clear to you, that you may reflect.**

(Shakir, M. H.)

### Al-Imran, 3:117

003.117 What they spend in the life of this (material) world **May be likened to a wind which brings a nipping frost: It strikes and destroys the harvest of men who have wronged their own souls: it is not God that hath wronged them, but they wrong themselves.**

(Ali, A. Yousuf)

3:118. The likeness of what they spend for the present life is as **the likeness of a wind wherein there is intense cold. It smites the harvest of a people who have wronged themselves and destroys it. And ALLAH wronged them not but they wronged themselves.**

(Ali, M. Sher)

003.117 The likeness of that which they spend in this life of the world is as **the likeness of a biting, icy wind which smiteth the harvest of a people who have wronged themselves, and devastateth it. Allah wronged them not, but they do wrong themselves.**

(Pickthall, M. M.)

117. The likeness of what they spend in the life of this world is as the likeness of wind in which is intense cold (that) smites the seed produce of a people who have done injustice to their souls and destroys it; and Allah is not unjust to them, but they are unjust to themselves.

(Shakir, M. H.)

These verses explain that plants can be easily destroyed by cold or hot winds and also by heavy rainfall.

**The Poets, 26:8**

**026.008 Verily, in this is a Sign: but most of them do not believe.**

(Ali, A. Yousuf)

**26: 9. In that is a Sign indeed; but most of these would not believe.**

(Ali, M. Sher)

**026.008 Lo! herein is indeed a portent; yet most of them are not believers.**

(Pickthall, M. M.)

**8. Most surely there is a sign in that, but most of them will not believe.**

(Shakir, M. H.)

**The Spider, 29:43**

**029.043 And such are the Parables We set forth for mankind, but only those understand them who have knowledge.**

(Ali, A. Yousuf)

**29: 44. And these are similitudes which WE set forth for mankind, but only those understand them who have knowledge.**

(Ali, M. Sher)

**029.043 As for these similitudes, We coin them for mankind, but none will grasp their meaning save the wise.**

(Pickthall, M. M.)

**43. And (as for) these examples, We set them forth for men, and none understand them but the learned.**

(Shakir, M. H.)

Allāh says that there are signs (of science) in the verses of the Holy Qur'ān, and only men of knowledge know them. The facts of pollination and pairs of plant were revealed in the Qur'ān 1400 years ago but scientists discovered them only at the end of the eighteenth century.

Most people cannot understand the meaning of the verses which are explained in this thesis without having a knowledge of geography.

**The Great Event, 56:63-67**

**056.063 See ye the seed that ye sow in the ground?**

**056.064 Is it ye that cause it to grow, or are We the Cause?**

**056.065 Were it Our Will, We could crumble it to dry powder, and ye would be left in wonderment,**

**056.066 (Saying), "We are indeed left with debts (for nothing):**

**056.067 "Indeed are we shut out (of the fruits of our labour)"**

(Ali, A. Yousuf)

**56: 64. Do you see what you sow ?**

**56: 65. Is it you who cause it to grow, or are WE the grower**

**56: 66. If WE so pleased, WE could reduce it all to withered stubble, then you would keep lamenting:**

**56: 67. `We are laden with debt !**

**56: 68. `Nay, we are totally deprived of everything.'**

(Ali, M. Sher)

**056.063 Have ye seen that which ye cultivate ?**

**056.064 Is it ye who foster it, or are We the Fosterer ?**

**056.065 If We willed, We verily could make it chaff, then would ye cease not to exclaim:**

**056.066 Lo! we are laden with debt!**

**056.067 Nay, but we are deprived!**

(Pickthall, M. M.)

**63. Have you considered what you sow?**

**64. Is it you that cause it to grow, or are We the causers of growth?**

**65. If We pleased, We should have certainly made it broken down into pieces, then would you begin to lament:**

**66. Surely we are burdened with debt:**

**67. Nay! we are deprived.**

(Shakir, M. H.)

Man has no control over weather. He cannot make the sun rise nor stop heavy rain or cold or hot winds. Weather is a very important factor in plant production. If the weather is not suitable, then man cannot grow plants. This is the reason why Allāh says in the Holy Qur'ān that no one can make a plant grow except Him.

### **5.3 CREATION OF ALL LIVING CREATURES FROM WATER**

Life is manifested by movement and growth. Movement is limited by space and time. Growth is known by increases in size and number. Anything that shows movement and growth is alive and is created from water as evidenced by the verse:

021.030 Do not the Unbelievers see that the heavens and the earth were joined together (as one unit of creation), before we clove them asunder? **We made from water every living thing. Will they not then believe?**

(21:30)

Water falls from the sky on the motionless earth, so that it moves. This means that the earth moves and grows. This is synonymous with life, as is stated in the verse:

022.005 O mankind! if yea have a doubt about the Resurrection, (consider) that We created you out of dust, then out of sperm, then out of a leech-like clot, then out of a morsel of flesh, partly formed and partly unformed, in order that We may manifest (our power) to you; and We cause whom We will to rest in the wombs for an appointed term, then do We bring you out as babes, then (foster you)\_that ye may reach your age of full strength; and some of you are called to die, and some are sent back to the feeblest old age, so that they know nothing after having known (much), and (further), **thou seest the earth barren and lifeless, but when We pour down rain on it, it is stirred (to life), it swells, and it puts forth every kind of beautiful growth (in pairs).**

(22:5)

The secrets of life are not known except to God, as is mentioned in this verse:

**011.007 He it is Who created the heavens and the earth in six Days - and His Throne was over the waters - that He might try you, which of you is best in conduct. But if thou wert to say to them, "Ye shall indeed be raised up after death", the Unbelievers would be sure to say, "This is nothing but obvious sorcery!"**

(11:7)

This means that water was created before the earth and the heavens. therefore, water is the origin of all creation. 65% of the human body is composed of water. Plants and animals cannot live without water. Water is necessary to maintain life by preserving the body's constitution and function. It is an essential constituent of all body tissues and fluids. All body functions take place in a watery medium. All body organs contain water to different degrees. The body maintains a regular balance of water. Excess water in tissues and organs produces certain diseases, and dehydration also produces serious diseases. Hence, water is maintained at a constant level in the body.

#### 5.4 THE EFFECT OF RAINFALL ON SOIL

021.030 Do not the Unbelievers see that the heavens and the earth were joined together (as one unit of creation), before we clove them asunder? **We made from water every living thing. Will they not then believe?**

(21:30)

022.005 O mankind! if ye have a doubt about the Resurrection, (consider) that We created you out of dust, then out of sperm, then out of a leech-like clot, then out of a morsel of flesh, partly formed and partly unformed, in order that We may manifest (our power) to you; and We cause whom We will to rest in the wombs for an appointed term, then do We bring you out as babes, then (foster you) that ye may reach your age of full strength; and some of you are called to die, and some are sent back to the feeblest old age, so that they know nothing after having known (much), and (further), **thou seest the earth barren and lifeless, but when We pour down rain on it, it is stirred (to life), it swells, and it puts forth every kind of beautiful growth (in pairs).**

(22:5)

037.011 Just ask their opinion: are they the more difficult to create, or the (other) beings We have created? **Them have We created out of a sticky clay!**

(37:11)

It is explained in these verses that God has created all living organisms from water and soil. When water is mixed with soil the activities of the living organisms are stimulated. It means that water produces effects which have been confirmed by modern scientists. These are shaking, swelling and vegetation.

The same thing happens to soil granules. These granules shake when water falls on them because they carry electric charges on their surfaces. These have to be neutralised before the granules can settle down. They move and shake in order to find the neutralising



counterpart. Furthermore, when water falls, a colloidal solution is created, and the molecules of the granules move in a Brownian movement and thus they shake.

The granules swell when they suck in water, which seeps between their layers, and thus they swell .

When the water falls, the seeds present in the ground start to grow, forming the radicle, which gives rise to the roots and then the plumule which in turn gives rise to the green part. Thus, the earth has vegetated.

The sequence of these three activities, shaking, swelling and vegetation as stated in the Qur'ān indicates quite obviously the miraculous and scientific aspects of these verses.

## **5.5 AGRICULTURE**

Agriculture consists of ploughing the land, harrowing it, watering it, and then sowing seed at the appropriate time, according to the weather. When the crops grow they have to be weeded and protected from birds, insects and diseases. Once they are ripe, they are harvested, prepared, packed and marketed. The most important precondition for agriculture is land, secondly, rainfall, thirdly weather, fourthly seed, and finally the hard work and dedication of the farmer.

Allāh (Nature) causes plants to grow on the basis of the natural resources available in the land.<sup>69</sup>

In the Holy Qur'ān Allāh mentions this,

**63. Have you considered what you sow?**

**64. Is it you that cause it to grow, or are We the causers of growth?**

(56:63-64)

**25. That We pour down the water, pouring (it) down in bundance,**

**26. Then We cleave the earth, cleaving (it) asunder,**

**27. Then We cause to grow therein the grain,**

**28. And grapes and clover,**

**29. And the olive and the palm,**

**30. And thick gardens,**

**31. And fruits and herbage**

**32. A provision for you and for your cattle.**

(80:25-32)

**10. And the earth, He has set it for living creatures;**

**11. Therein is fruit and palms having sheathed clusters,**

**12. And the grain with (its) husk and fragrance.**

**13. Which then of the bounties of your Lord will you deny?**

(55:10-13)

The proof of God's responsibility for agriculture is that we see vegetation in places where man himself is not present to cultivate crops. Thus, it is God who causes plants to grow in these places, for example by spreading pollen, with the aid of wind and insects.

Another proof of God's responsibility for agriculture is that climate and rainfall are not under the control of man. According to the Holy Qur'ān, if Allāh does not want it to rain, there will be no rainfall. Plants require heat and light to grow, so one may ask how anything can grow without God's dispensation in these matters.

Man cannot make rain fall nor can he make the sun rise. If God causes heavy rain, or blows hot or cold air on the fields, plants can be destroyed. God says in the holy Qur'ān:

**264. O you who believe! do not make your charity worthless by reproach and injury, like him who spends his property to be seen by men and does not believe in Allah and the last day; so his parable is as the parable of a smooth rock with earth upon it, then a heavy rain falls upon it, so it leaves it bare; they shall not be able to gain anything of what they have earned; and Allah does not guide the unbelieving people.**

**266. Does one of you like that he should have a garden of palms and vines with streams flowing beneath it; he has in it all kinds of fruits; and old age has overtaken him and he has eak off spring, when, (lo!) a whirlwind with fire in it smites it so it becomes blasted; thus Allah makes the communications clear to you, that you may reflect.**

(2:264-266)

117. The likeness of what they spend in the life of this world is as the likeness of wind in which is intense cold (that) smites the seed produce of a people who have done injustice to their souls and destroys it; and Allah is not unjust to them, but they are unjust to themselves.

(3:117)

32. And set forth to them a parable of two men; for one of them We made two gardens of grape vines, and We surrounded them both with palms, and in the midst of them We made cornfields.

33. Both these gardens yielded their fruits, and failed not aught thereof, and We caused a river to gush forth in their midst,

34. And he possessed much wealth; so he said to his companion, while he disputed with him: I have greater wealth than you, and am mightier in followers.

35. And he entered his garden while he was unjust to himself. He said: I do not think that this will ever perish

36. And I do not think the hour will come, and even if I am returned to my Lord I will most certainly find a returning place better than this.

37. His companion said to him while disputing with him: Do you disbelieve in Him Who created you from dust, then from a small seed, then He made you a perfect man?

38. But as for me, He, Allah, is my Lord, and I do not associate anyone with my Lord.

39. And wherefore did you not say when you entered your garden: It is as Allah has pleased, there is no power save in Allah? If you consider me to be inferior to you in wealth and children,

40. Then maybe my Lord will give me what is better than your garden, and send on it a thunderbolt from heaven so that it shall become even ground without plant,

41. Or its waters should sink down into the ground so that you are unable to find it.

**42. And his wealth was destroyed; so he began to wring his hands for what he had spent on it, while it lay, having fallen down upon its roofs, and he said: Ah me! would that I had not associated anyone with my Lord.**

**43. And he had no host to help him besides Allah nor could he defend**

**44. Here is protection only Allah's, the True One; He is best in (the giving of) reward and best in requiting.**

**45. And set forth to them parable of the life of this world: like water which We send down from the cloud so the herbage of the earth becomes tangled on account of it, then it becomes dry broken into pieces which the winds scatter; and Allah is the holder of power over all things.**

**46. Wealth and children are an adornment of the life of this world; and the ever-abiding, the good works, are better with your Lord in reward and better in expectation.**

(18: 35-42)

**17. Surely We will try them as We tried the owners of the garden, when they swore that they would certainly cut off the produce in the morning,**

**18. And were not willing to set aside a portion (for the poor).**

**19. Then there encompassed it a visitation from your Lord while they were sleeping.**

20. So it became as black, barren land.
21. And they called out to each other in the morning,
22. Saying: Go early to your tilth if you would cut (the produce).
23. So they went, while they consulted together secretly,
24. Saying: No poor man shall enter it today upon you.
25. And in the morning they went, having the power to prevent.
26. But when they saw it, they said: Most surely we have gone astray
27. Nay! we are made to suffer privation.
28. The best of them said: Did I not say to you, Why do you not glorify (Allah)?
29. They said: Glory be to our Lord, surely we were unjust.
30. Then some of them advanced against others, blaming each other.
31. Said they: O woe to us! surely we were inordinate:
32. Maybe, our Lord will give us instead one better than it; surely to our Lord do we make our humble petition.
33. Such is the chastisement, and certainly the chastisement of the hereafter is greater, did they but know!
34. Surely those who guard (against evil) shall have with their Lord gardens of bliss.

**35. What! shall We then make (i.e. treat) those who submit as be guilty?**

**36. What has happened to you? How do you judge?**

(68:17-36)

24. The likeness of this world's life is only as water which We send down from the cloud, then the herbage of the earth of which men and cattle eat grows luxuriantly thereby, until when the earth puts on its golden raiment and it becomes garnished, and its people think that they have power over it, Our command comes to it, by night or by day, so We render it as reaped seed; produce, as though it had not been in existence yesterday; thus do We make clear the communications for a people who reflect.

(10:24)

In spite of all the hard work and dedication of man, if God does not want plants to thrive, they will not do so. He may destroy them at will, by adverse weather or other means; by wind, by heat storm, and by heavy rainfall.

We have observed that good agriculture is possible where the climate is agreeable. In other places where the climate is harsh, no type of crop can grow, for example in the Tundra, where the sun's power is limited, and the earth is frozen much of the time. The only things that grow there are bushes and conifers.

So we have to accept the fact that man cannot grow crops solely through his own determination (without the will of Allāh). Even with the development of advanced technology, he is still at the mercy of God

Most crops grow according to the weather conditions. In Asia, especially in Pakistan and India, two types of crops grow. One type is called rabī<sup>c</sup> and the other is called kharīf. Rabī<sup>c</sup> crops are sown in

winter and harvested in summer while kharif crops are sown in summer and harvested in winter. Owing to their specific needs of weather and temperature conditions, crops which grow in winter cannot be grown in summer and the crops which grow in summer cannot be grown in winter. Even if we create an artificial weather environment by growing plants in a greenhouse, only some fruits and vegetables can be produced. Their quantity will be limited, and their taste will not be the same as that of the outdoor ones. Their production will also be more expensive. So we may say that man is never able to produce anything by his own will and choice. All this is beyond his control.



## 5.6 PLANT PRODUCTION

048.029 Muhammad is the apostle of God; and those who are with him are strong against Unbelievers, (but) compassionate amongst each other. Thou wilt see them bow and prostrate themselves (in prayer), seeking Grace from God and (His) Good Pleasure. On their faces are their marks, (being) the traces of their prostration. This is their similitude in the Taurat; and their similitude in the Gospel is: **like a seed which sends forth its blade, then makes it strong; it then becomes thick, and it stands on its own stem, (filling) the sowers with wonder and delight.** As a result, it fills the Unbelievers with rage at them. God has promised those among them who believe and do righteous deeds forgiveness, and a great Reward.

( 48:29)

In this verse, God speaks of a special type of plant and that is the Gramineae such as wheat, barley and rice. These produce side shoots which are exactly similar to the original plant. These plants produce such branches in the first growth period after plantation and the appearance of the primordial. Then God states that He strengthens them. This means that the plant makes these shoots stronger.

This is a scientific fact that has been proved after lot of delicate experiments which lasted for long periods of time. The shoots remain dependent on the main plant for their nutrition until they develop for themselves three green leaves and three to five roots. After that, they depend on their own self for nutrition by sucking the nutrients through their roots and start to produce starchy substances through their leaves. Then it is designated "rising firm". Studies performed by scientists all over the world have shown that the side branches, after producing their own leaves and roots, start to form

nodes. Here the strengthening and firming, through an increase in thickness start. This stage is known as the jointing stage.

As for the words "riseth firm upon its stalk", scientific studies have shown that the stem elongation stage comes after the node formation. This is the same sequence as stated in the Holy Qur'ān.

## **5.7 PAIRS OF PLANTS**

**3. And He it is Who spread the earth and made in it firm mountains and rivers, and of all fruits He has made in it pairs two kinds; He makes the night cover the day; most surely there are signs in this for a people who reflect.**

(13:3)

**53. Who made the earth for you an expanse and made for you therein paths and sent down water from the cloud; then thereby We have brought forth many species of various herbs.**

(20:53)

**And you see the earth sterile land, but when We send down on it the water, it stirs and swells and brings forth of every kind a beautiful herbage.**

(22:5)

**7. Do they not see the earth, how many of every noble kind We have caused to grow in it in pairs?**

(26:7)

**10. He created the heavens without pillars as you see them, and put mountains upon the earth lest it might convulse with you, and He spread in it animals of every kind; and We sent down water from the cloud, then caused to grow therein (vegetation) of every noble kind.**

(31:10)

**036.036 Glory to God, Who created in pairs all things that the earth produces, as well as their own (human) kind and (other) things of which they have no knowledge.**

(36:36)

**49 And of every thing We have created pairs: That ye receive instruction.**

(51:49)

These verses contain information which has been corroborated by modern science. For example, the existence of the sexes, male and female, as the means of reproduction within plants. Moreover, the modern understanding of self-fertilising plants is anticipated. The different kinds of plant are correctly classified into their categories, for example the palm tree is cited as a tree which has both male and female flowers. The same is said of beans, and this is also confirmed by modern science. Many details of the process of plant reproduction are described in the Qur'ān: it shows the importance of the wind as a pollinating agent.

Allāh says:

**63. Have you considered what you sow?**

**64. Is it you that cause it to grow, or are We the causers of growth?**

(56:63-64)

## 5.8 WIND POLLINATION

**22. And We send the winds fertilising, then send down water from the cloud so We give it to you to drink of, nor is it you who store it up.**

(15:22)

- 1 By the (Winds) that scatter broadcast;**
- 2 And those that lift and bear away heavy weights;**
- 3 And those that flow with ease and gentleness;**
- 4 And those that distribute and apportion by Command;-**
- 5 Verily that which ye are promised is true;**

(51:1-5)

The Qur'ān explains the process by which the air carries the pollinating agent so that reproduction may occur. As the Qur'ān describes, pollination consists of carrying the pollen from a male organ into a female one. There are two methods of pollination.

Self—pollination occurs in many cases, and in the case where one flower pollinates the stigma of another it is known as cross—pollination.

The means whereby pollinating agents are borne from plant to plant are principally wind and insects. Other agents of less importance are water, birds, animals and sometimes man himself. The advantage of the wind is that it bears the pollen for long distances. The wind is perhaps the primary method and is utilised by cotton, corn, pines, many grasses, ragweed, and cat's tail, for example.

## 5.9 FIRE FROM A GREEN TREE

The Qur'ān refers to a most unusual phenomenon, namely the production of fire from green wood:

**036.080** "The same Who produces for you fire out of the green tree, when behold! ye kindle therewith (your own fires)!

(Yaseen, 36:80)

**056.071** See ye the Fire which ye kindle?

**056.072** Is it ye who grow the tree which feeds the fire, or do We grow it?

**056.073** We have made it a memorial (of Our handiwork), and an article of comfort and convenience for the denizens of deserts.

(The Great Event, 56:71-73)

It has been observed that fire can be produced by green branches of bamboo.

## 5.10 NECESSITY OF FOOD

Food is a basic requirement of man, without which we cannot live. A hungry person is unable properly to fulfil his obligations religious and, political responsibilities, or to indulge in educational and scientific thought.

A person with an empty stomach begins to doubt whether Almighty God exists. The Prophet (pbuh) was much aware of this condition of man:

"Poverty is almost unbelief."

مَا دَ الْفَقْرَانِ يَكُونُ كُفْرًا

And again: "Oh God I beg your safety from unbelief and poverty."

اللَّهُمَّ إِنِّي أَعُوذُ بِكَ مِنَ الْكُفْرِ وَالْفَقْرِ

The Prophet Muhammad (pbuh) said that one should never ask for an opinion from a person who has no food in his house because he is upset. Therefore, his decision might not be correct.

Islam advises the intensive practice agriculture. The Prophet said,

"Search for food in the hidden places of the earth".

اطْلُبُوا الرِّزْقَ فِي قُبَايَا الْأَرْضِ (عن عائشة رضي الله عنها)

If some land can produce 10 maunds of crops but instead produces only 9, due to ignorance and laziness, then according to the Islamic point of view the farmer who produces less will be responsible for the shortage of food on the day of Judgement. It will have been his fault that human beings have been unable to obtain adequate sustenance.

'Umar b. 'Abd al-'Aziz promulgated an order throughout the whole Islamic empire:

"Do not leave the earth without agriculture. If a farmer does not agree to cultivate the land on half lease then give him one third lease. If he does not agree to this then give him one tenth of a portion lease. If nobody wants to cultivate the land then give it free to them. At the end if there is no-one who is prepared to cultivate the land, then spend the money from the government treasury and cultivate the land."<sup>70</sup>

The Prophet said, "Barren land becomes the property of him who cultivates it."

He again said, "He who has the land should cultivate it; if not, he should leave his brother free to cultivate it" Or a person does not cultivate himself and does not let another person cultivate but instead keeps his land barren the Prophet stated that, "a person who keeps land barren, loses his rights to it after three years".

In such a case, it is the duty of the government to give the uncultivated land to a person who is needy.



## **5.11 IMPORTANCE OF AGRICULTURE IN THE LIGHT OF THE QUR'ĀN AND SUNNAH**

The topic of agricultural production is the most important in the Holy Qur'ān and Geography. Agriculture was the first occupation of man after hunting, and it is the basis for settled civilisation. The history of agriculture is as old as the history of man. The Prophet (pbuh) pointed out that after the expulsion from the garden, the prophet Adam's (pbuh) occupation was agriculture:

"Adam was a farmer."

كَانَ آدَمُ قَرَانًا

This occupation enhances the relationship between God and man. The farmer sows the seed in the soil and trusts that Allāh will help the plants to grow into crops by His blessing.

Allāh says that this trust is due to His kindness and explains that the result of the work of the farmer is due to His action.

**63. Have you considered what you sow?**

**64. Is it you that cause it to grow, or are We the causers of growth?**

(56:63-64)

The Prophet (pbuh) said that the whole process of agriculture and harvesting was a form of alms.

"If a Muslim grows trees or practises agriculture on his fields to benefit the human beings, animals and birds, this becomes alms for the person (owner).<sup>71</sup>

"Narrated Anas bin Malik Allah's Messenger said, "There is none amongst the Muslims who plants a tree or sows seeds, and then a bird, or a person or an animal eats from it, but is regarded as a charitable gift for him."<sup>72</sup>

The Prophet (pbuh) himself carried on agriculture with his own hands at Jurf.

وَرَزَعَ رَسُولُ اللَّهِ صَلَّى اللَّهُ عَلَيْهِ وَسَلَّمَ بِالْجُرْفِ

When the Prophet (pbuh) saw the marks of the spade and shovel on the hands of the chief of the tribe Aws Sa'īd b. Mayyāz, he kissed both his hands and said, "the palms of both hands are dear to Allāh".

## 5.12 CONCLUSION

Plant production is essential and should be given priority in any community. God, according to the Qur'ān, has spread out the earth and made it suitable and fertile for cultivation. He sends the "fertilising winds" to drive the clouds and scatter the seeds and He sends down rain to bring forth vegetation of all kinds. The many verses in which these bounties and favours of Allāh are mentioned all serve to encourage people not only to thank God but to engage in plant production.

Rainfall is the blessing of Allāh. It helps to sustain life of all types on the earth. Owing to rainfall, plants grow. Plants serve as a source of food for human beings and herbivorous animals. Without plants there would be no food at all. Without rain or plants the ecosystem on earth would cease to function and, consequently, life on earth would come to an end. This is the reason why Allāh explains both topics again and again: simply because the benefits that human beings obtain from rainfall and plants are too immense to be ignored.

There is a co-relation between rainfall and plant production. As rain falls it erodes the soil and the rain water transports this eroded material to wherever the rivers flow over. Owing to sedimentation, the soil is deposited and the land becomes more fertile. Later, plants grow by the blessing of Allāh

Obviously, if there were no rainfall it would be impossible for the plants to grow. So we should observe these blessings of God, which are explained in detail in the Holy Qur'ān.

The Qur'ān, also explains scientific facts related to plants. The effect of rain on soil and plants; the effect of weather on plants; the dispersion of seeds and pollination by winds; and the pairs of plants. These facts were revealed in the Qur'ān before the dawn of the scientific era.

### 5.13 REFERENCES

68. Bucaille, Maurice, The Qur'ān, the Bible and Science, Islamabad, 1992, 110.
69. al-Bukhari, The Translation of the Meanings of Sahih Al-Bukhari, Arabic-English, vol. 3, New Delhi, 1987, 295.
70. Jamal-Ud-Din, Islamic Agriculture, D. G. Khan 1971.
71. al-Bukhari, op. cit., 19.
72. Ibid., 295.

**CHAPTER NO: 6**  
**CONCLUSION AND PROPOSALS**

**67: 21**

Or who is it that will give you sustenance if He should withhold His sustenance? Nay! they persist in disdain and aversion.

**13: 15**

And whoever is in the heavens and the earth makes obeisance to Allah only, willingly and unwillingly, and their shadows too at noon and eve.

Ali, A. Yousuf

## **CONCLUSIONS AND PROPOSALS**

Until this time, the scientific content of the Holy Qur'ān has not been adequately explored, and the correlation's between the Holy Qur'ān and geographical science have gone unnoticed. The purpose of this thesis is to address those shortcomings. The completion of the present research tends, in general, to confirm the factual basis of Qur'anic science, and it supports the hypothesis that the assertions of the holy verses may worthily take their place alongside the propositions of modern research: ancient revealed wisdom and modern discovered knowledge are each other's ally. Thus, geography and the Qur'ān may fruitfully be studied together.

A certain amount of originality is claimed for the current work: the comparison of specific Qur'anic verses with specific scientific work has not been undertaken before in this form. Moreover, the fruitful cross-fertilisation of religion and science has yielded connections which hitherto have remained hidden: the scientific nature of the Qur'ān has been revealed and the religious nature of the world has been unveiled.

The very richness of The Holy Qur'ān, in terms of geographical fact, has made it impossible to give an exhaustive survey of all the relevant verses. Thus five chapters have delimited the scope of the study. These deal with the Holy Qur'ān and Scientific Investigation, Rainfall, Soil, Sedimentation and Plant Production. However, it is anticipated that a further study will explore the areas of research that have been here omitted.



There is much work to do in the development of Qur'anic science. However, there is also much promise that such work will be undertaken. The younger generations of Pakistan, for instance, are taking a great interest in the study of the Holy Qur'ān from a scientific point of view. There may as yet be no suitable study material which describes the relationship between science and the Qur'ān, but the present work hopes to take the first steps towards developing these links.

In view of the above, the following proposals are suggested:

1. A Qur'anic research academy where every field of science can be studied in the light of the Holy Qur'ān by a variety of subject specialists.
2. A research programme examining Qur'anic theory through practical experimentation directed towards the goal of practical use.

The programme will arrange for laboratories to do practical research as has been done for sedimentation and soil analysis. A specific example of this practical approach would be the analysis of particle size described in chapter 4 in this thesis in the following terms:

- I. Particle Size Analysis by Dry-Sieving Method
- II. Electron Microscopy Scanning of the Particles
- III. Particle Size Analysis by Wet Sieving Method
- IV. Stokes's Law of Particle Settling.

3. Future study will endeavour to reveal further scientific knowledge which may yet lie dormant within the verses of the Holy Qur'ān in general, and in the following verses in particular:

"And whoever is in the heavens and the earth makes obeisance to Allah only, willingly and unwillingly, and their shadows too at morn and eve".

(13: 15)

"Glorious is He who created all pairs among those which the earth produces and among themselves and among those which they know not".

(36: 36)

"Surely We have created everything according to a measure".

(54: 49)

"And the herbs and the trees do adore (Him)".

(55: 6)

"He has let free the two bodies of flowing water, meeting together".

(55: 19)

"Between them is a Barrier which they do not transgress"

(55: 20)

"Or who is it that will give you sustenance if He should withhold His sustenance? Nay! they persist in disdain and aversion".

(67: 21)

Other kinds of proposals for further study may also be gleaned from the Qur'ān. Voyages of discovery, like the travels of the knowledge-seeking early Muslims, are advocated and strongly recommended.

For instance, the Qur'ān implied that both sun and moon would eventually seek the benefit of man. On the other hand, both sun and moon will be discovered, and they will lay their secrets open to man. Man has already landed on the moon, and if landing on the sun cannot be taken literally, the exploration of the sun by probes, and by earth-based solar research, has contributed to our sum of knowledge and promised much for the betterment of the human condition by the application of solar science. It is said in the Qur'ān

29. Do you not see that Allah makes the night to enter into the day, and He makes the day to enter into the night, and He has made the sun and the moon subservient (to you); each pursues its course till an appointed time; and that Allah is Aware of what you do?

(31: 29)

4. The scientific content of The Holy Qur'ān may be better represented if scientific terminology is employed. The lack of scientific terminology in the Holy Qur'ān is something which has occurred through out its various translations.

There are several issues relating to the matter of translation. The first is a question of delivery or rather a consideration of to whom the claims are addressed. Given the indeterminacy of translation, one is often faced with a choice: either to make the most literal

translation possible, or to skew the translation wherever possible in favour of scientific terminology. Given the premise, confirmed elsewhere, that the Qur'ān is a work of science, one may be justified in translating a particular word in its scientific sense, provided this expedient does no injustice to the spirit of the original, even if this involves some violence to the letter. This is not then merely politics or rhetoric: if one uses the word 'gas' rather than 'smoke' even where the literal translation would suggest the latter, the former may be justified on the ground that it enables the Western scientist to perceive the Qur'ān within the scientific canon it deserves to belong to.

On these grounds description of the water cycle as they appear in the Holy Qur'ān might profitably use the terms precipitation and evaporation in place of the vernacular 'falling from the sky' and 'returning to the sky'.

Many translators, writing from a strictly religious perspective, have given the Qur'ān a non-scientific interpretation and eschewed a style which would have been more appropriate to its scientific status.

In future, therefore, one would hope that translators may be equipped with the scientific background necessary for the task.

Of course, a reductive scientific stance would not be appropriate: the Qur'ān is a work unifying the poles of religion and science, not one rejecting either; thus a holistic approach is necessary.

5. Muslims also respect the Jewish and Christian scriptures. Scientific research of the kind advocated here should attempt to discern scientific content within these as well, since all are the voice of God in one form or other.

The present work then, may be seen as a small part of a much greater project with the aim of bringing together not only science and religion, but also Jewish, Christian and Muslim religious communities for the purposes of improving the moral and physical condition of our life on this earth.

May God help in making people see merit in these proposals.

**BIBLIOGRAPHY**

**22: 70**

Do you not know that Allah knows what is in the heaven and the earth? Surely this is in a book; surely this is easy

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## **BIBLIOGRAPHY**

Abd ar-Rahman, Aisha, Subatomic World in the Qur'ān, Cambridge 1981.

'Abdal Bāqī, Muhammad Fu'ād, (ed.), al-Mu'jam al- Mufahras li-Alfāz al- Qur'ān al-Karīm, Cairo 1988.

Adams, H., Water and the Waterworks, Oxford 1962.

Ahmad, Asrār, Hikmat al Qur'ān, Lahore 1989.

Ahmad, Kamal, World of Plants, Lahore 1962.

Ahmad, M. S, Islamic Agriculture and Land, Karachi 1955.

Akhtar, 'Alī. Mahmūd, I'jāz al Qur'ān, Lahore 1401 A.H.

Albar, Mohammed Ali, Human Development As Revealed in the Holy Qur'ān and Hadith (the Creation of Man between Medicine and the Qur'ān), Jeddah 1992.

Afdal al-Rahmān, Quranic Sciences, London 1981.

Ali, A. Yousuf, The Glorious Qur'ān, Riyadh 1975.

Ali, M. Sher, The Holy Qur'ān, (16th ed.), Tilford 1992.



- Allen, J.R.L., Experiments in Physical Sedimentology, London 1985.
- Allen, R.E. John, Physical Processes of Sedimentation: An Introduction,  
London 1970.
- Anjum, Ahmad Riyad, Qur'ān aur Asrār-e-Kayyinat, Lahore 1989.
- Arnold, Thomas Walker, (ed.), The Legacy of Islam, Oxford 1949.
- Asghar, M., History of Islamic Agriculture, Karachi 1960.
- Ashraf, Hafiz Muhammad, Islam kā Nizām-e-Hayāt, Bahawalpur n.d.
- al-Baghdādī, Ismā'il Bāshā, Nodiyyat al-'Ārifin, Vol. II, Istanbul 1951.
- Barq, Ghulām Jaylānī, Dō Qur'ān, Hyderabad 1969.
- Boggs, Sam Jr., Principles of Sedimentology and Stratigraphy, Toronto  
1987.
- Brater, E.F. Wisler, C.O. Hydrology, New York 1959.
- Brifault, Robert, The Making of Humanity, Lahore 1980.
- Bucaille, Maurice, The Qur'ān, the Bible and Science, Islamabad 1992.

Buchanan, J.B., "Sediment Analysis", in Methods for the Study of Marine Benthos, Holme, N.A. & McIntyre, A.D. (eds.), Oxford 1984.

al-Bukhārī, Abū 'Abd Allāh Muhammad b Ismā'il, al Jāmi' al-Sahīh, Vol. 1, Leiden 1862.

al-Bukhārī, Abū 'Abd Allāh Muhammad b Ismā'il, The Translation of the Meanings of Sahīh al-Bukhārī, Arabic-English, vol. 3, New Delhi 1987.

Chamley, Hervé, Sedimentology, New York 1990.

Chippa, Abdul Karim, Beauty and Wisdom of the Holy Qur'ān, Karachi 1971.

Denffer, Ahmad Von, Research in Islam: Basic Principles and Practical Suggestions, Leicester 1983.

Draper, J. W., Conflict of Religion and Science, Karachi 1926.

Dunlop, D. M., Arabic Science in the West, Karachi 1958.

Eden, Philip Twist Clint, Weather Facts, London 1995.

El-Bakry, Ehsan, How the Qur'ān gave a New Impetus to Education and Scientific Learning, n.p.1917.

Fahmy, Aly. Mohamed, Muslim Sea Power in the Eastern Mediterranean from the Seventh to the Tenth Century A.D., Cairo 1966.

al-Fārisī, Kamāl al-Dīn Abū al-Hasan, Tanqīh al-Manāzīr, Vol. 1,

Farooqi, Iqtedar Husain, Plants of the Qur'ān, Lucknow 1989.

Fatmi, S. H., The Holy Qur'ān, London 1972.

Gīlānī, Sayyid As ' ad, Rūh-e-Qur'ān, Lahore 1411 A. H.

Graedel, T. E., & Crutzen, P. J., Atmospheric Change: An Earth System Perspective, New York 1993.

Gross, M. Grant, Oceanography: A View of the Earth (7th ed.), Upper Saddle River (N. J.) 1996.

Gulen, M. Fethullah, Questions this Modern Age puts to Islam 1, London 1993.

Hājī, Khalīfah, Kashf al-Zunūn, Vol. 11, Istanbul 1943.

Hamid, Abdul Wahid, Islam the Natural Way, London 1990.

Hitti, Philip, K., History of the Arabs, London 1970.

Hooykaas, R., Natural Law and Divine Miracle: The Principle of Uniformity in Geology, Biology and Theology, Leiden 1963.

Husayn, Muzaffar, Sā' ins kī Diniyyāt, Lahore 1984.

Ibn Abī Ya`qūb, Ahmad, Kitāb al-Buldān, Najaf 1910.

Ibn Khurdādbih, Muhsin, Kitāb al-Masālik wa-al-Mamālik, Leiden 1306  
A.H.

Ibn Mājah, Sunan Ibn Majāh, Beirut 1940.

Iqbal, Muhammad, The Reconstruction of Religious Thought in Islam,  
Lahore 1977.

Iran Society, al-Biruni, Calcutta 1951.

al-Istakhrī, Kitāb al-Masālik wa-al-Mamālik, Leiden 1927.

Ja`farī, Asghar `Ali Shāh, Islām aur Sā' ins, Lahore n.d.

Jallendhri, Maulana Fateh Mohammed, Holy Qur'ān (5th ed.), Delhi 1976.

Jamal-Ud-Din, Islamic Agriculture, D.G.Khan 1971.

Khalīl, Ahmad. Khan, Mawsim, Karachi 1983.

Khan, A. A, Islam and Science, Lahore 1984.

al-Khāzinī, Abū Ja ' far, Mīzān al-Hikmah, Hyderabad 1359 A.H.

Kurashi, K. U, Geography of Pakistan, Lahore 1979.

Landau, Rom, Islam and the Arabs, Woking and London 1958.

Leeder, M. R., Sedimentology: Process and Product, London 1988.

Lewis, Bernard, (ed.), The World of Islam, London 1976

Lindholm, Roy, A Practical Approach to Sedimentology, London 1987.

Linsley, K. Ray. et al., Hydrology for Engineers, Tokyo 1958.

Mālik b Anas, al-Muwatta, Karachi 1972.

McHenry, Robert, The New Encyclopaedia Britannica (15th ed), Chicago  
1992.

Merriam, F. Daniel, Bulletin, 169, Vol. 1, Leicester 1965.

Methods of Study of Sediments, New York 1941.

Meyerhof, Max, On the Transmission of Greek and Indian Science to the Arabs, Delhi 1937.

Mir, Muhammad Husayn, Mādamīn-e-Qur'ān, Lahore 1983.

Morgan, R.P.C., Soil Erosion & Conservation, Essex 1986.

Nadawī, Mawlānā. Muhammad. Shihāb-al-Dīn, Qur'ān Majīd aur Dunyā' - Hayāt, Lahore 1986.

Qur'ān Sā' ins aur Mussulīman, Lahore 1988

Islām aur Jadīd Sā' ins, Lahore 1987.

Nasr, Seyyed Hussein, Preface to Rihlat Ibn al-Jubayr, Cairo 1955

An Introduction to Islamic Cosmological Doctrines, London 1976.

Nurbaki, Haluk, Verses from Holy Qur'an and Facts of Science, Karachi 1990.

Nursi, Said, The Words 1, London 1993.

The Letters 1, London 1993.

Odum, P.Eugene, Ecology, Georgia 1979.

Palmer, E.H., The Qur'ān, London 1987.

Peters, F. E., Allah's Commonwealth, New York 1973.

Pickthall, M. Marmaduke, The meanings of the Glorious Qur'ān, London 1993.

Press, F. & Siever, R., Earth (4th ed.), New York 1984.

al-Qiftī, 'Alī b Yūsuf, Tārīkh al-Hukamā, Leipzig 1903.

al-Rahman, M. H., Islām kā Iqtisādī Nizām, Lahore 1959.

Reineck, H.-E., Singh, I. B., Depositional Sedimentary Environments, New York 1980.

Rice, J.R., Fundamentals of Geomorphology, New York 1988.

Richards, Keith, Rivers: Form and Process in Alluvial Channels, London 1985.

Rūhānī Bāzī, Muhammad. Mūsā, al-Hay'ah al-Sughra ma'a Shah-ha Madār al-Bushrā, Lahore 1995.

As-Saleh, Saleh, The Purpose Behind Creation and the Return to the Creator, Cairo 1994.

Sarton, George, Introduction to the History of Science, Vol.1, Washington 1950.

Selley, C. Richard, An Introduction to Sedimentology, New York 1976.

Shaheed, Seyyed Qutub, Qur'ān and Science, Lahore 1993.

Shakir, M. H., Holy Qur'ān (al-Qur'ān al-Hakīm), (6th ed.), New York 1988.

Silkin, Jon, The Principle of Water, Cheshire 1974.

Sumner, Graham, Precipitation: Process & Analysis, Chichester 1988.

Sutton, Graham, The Weather, London 1974.

The Muslim Scientist, Applied Science for Muslim World Development, Part 1, West Lafayette 1981.

Thompson, J. W., The Introduction of Arab Science into the Lorraine in the 10th century, n.p. 1929.

Thornbury, D. William, Principles of Geomorphology, Delhi, 1993.

Totah, Khalil, The Contribution of the Arabs to Education, n.p. n.d.

Trask, D. Parker, Applied Sedimentation, New York 1950.



Twenhofel, W.H., Principles of Sedimentation, New York 1939.

Uman, Martin. A., Lightning, New York 1969.

Umar, Ridā Kakhālah, Mu'jam al-Mua'llifin, Vol. X1, Dmascus.

Ünal, F. Taha, The Crossroads, Izmir 1993.

UNESCO/FAO Group, Man's influence on the Hydrologic Cycle: A draft Report, Rome 1973.

Validi, Ahmet, Zeki, Islam and the Science of Geography, n.p. 1934.

al-Wāsifī, Hakīm Nayyār, Tibb al-'Arab, (Urdu translation of Arabian Medicine, by E.G.Browne), Lahore 1954.

Whalley, W. Brian (ed.), Scanning Electron Microscopy in the Study of Sediments a Symposium, Norwich 1978.

White, I.D., et al., Environmental Systems An Introductory Text, London 1990.

