

The Qur'an and Modern Science

1) Introduction

The relationship between the Qur'an and science is a priori a surprise, especially when it turns out to one of harmony and not of discord. A confrontation between a religious book and the secular ideas proclaimed by science is perhaps, in the eyes of many people today, something of a paradox. The majority of today's scientists, with a small number of exceptions of course, are indeed bound up in materialist theories, and have only indifference or contempt for religious questions which they often consider to be founded on legend.

In the West, moreover, when science and religion are discussed, people are quite willing to mention Judaism and Christianity among the religions referred to, but they hardly ever think of Islam. So many false judgements based on inaccurate ideas have indeed been made about it, that today it is very difficult to form an exact notion of the reality of Islam. As a prelude to any confrontation between the Islamic Revelation and science, it would seem essential that an outline be given of a religion that is so little known in the West.

The totally erroneous statements made about Islam in the West are sometimes the result of ignorance, and sometimes of systematic denigration. The most serious of all the untruths told about it are however those dealing with facts; while mistaken opinions are excusable, the presentation of facts running contrary to the reality is not. It is disturbing to read blatant untruths in eminently respectable works written by authors who a priori are highly qualified.

The following is an example taken from the Universalis Encyclopedia (Encyclopedia Universalis) vol. 6. Under the heading Gospels (Evangiles) the author alludes to the differences between the latter and the Qur'an: "The evangelists...do not..., as in the Qur'an, claim to transmit an autobiography that God miraculously dictated to the Prophet." In fact, the Qur'an has nothing to do with an autobiography: it is a preaching; a consultation of even the worst translation would have made that clear to the author.

The statement we have quoted is as far from reality as if one were to define a Gospel as an account of

an evangelist's life. The person responsible for this untruth about the Qur'an is a professor at the Jesuit Faculty of Theology, Lyon! The fact that people utter such untruths helps to give a false impression of the Qur'an and Islam.

There is hope today however because religions are no longer as inward-looking as they were and many of them are seeking for mutual understanding. One must indeed be impressed by a knowledge of the fact that an attempt is being made on the highest level of the hierarchy by Roman Catholics to establish contact with Muslims; they are trying to fight incomprehension and are doing their utmost to change the inaccurate views on Islam that are so widely held.

In the Introduction to this work, I mentioned the great change that has taken place in the last few years and I quoted a document produced by the Office for Non-Christian Affairs at the Vatican under the title *Orientations for a Dialogue between Christians and Muslims* (*Orientations pour un dialogue entre chrétiens et musulmans*).

It is a very important document in that it shows the new position adopted towards Islam. As we read in the third edition of this study (1970), this new position calls for 'a revision of our attitude towards it and a critical examination of our prejudices... We should first set about progressively changing the way our Christian brothers see it.

This is the most important of all. We must clear away the outdated image inherited from the past, or distorted by prejudice and slander... and 'recognize the past injustice towards the Muslims for which the West, with its Christian education, is to blame.¹ The Vatican document is nearly 150 pages long. It therefore expands on the refutation of classic views held by Christians on Islam and sets out the reality.

Under the title 'Emancipating ourselves from our worst prejudices' (*Nous libérer de nos préjugés les plus notables*) the authors address the following suggestions to Christians: "Here also, we must surrender to a deep purification of our attitude. In particular, what is meant by this are certain 'set judgements' that are all too often and too lightly made about Islam. It is essential not to cultivate in the secret of our hearts views such as these, too easily or arbitrarily arrived at, and which the sincere Muslim finds confusing."

One extremely important view of this kind is the attitude which leads people to repeatedly use the term Allah to mean the God of the Muslims, as if the Muslims believed in a God who was different from the God of the Christians. Allah means 'the Divinity' in Arabic: it is a single God, implying that a correct transcription can only render the exact meaning of the word with the help of the expression 'God'. For the Muslim, Allah is none other than the God of Moses and Jesus.

The document produced by the Office for Non-Christian Affairs at the Vatican stresses this fundamental point in the following terms:

"It would seem pointless to maintain that Allah is not really God, as do certain people in the West! The conciliar documents have put the above assertion in its proper place. There is no better way of

illustrating Islamic faith in God than by quoting the following extracts from *Lumen Gentium*². 'The Muslims profess the faith of Abraham and worship with us the sole merciful God, who is the future judge of men on the Day of Reckoning...' "

One can therefore understand the Muslims' protest at the all too frequent custom in European languages of saying 'Allah' instead of 'God'... Cultivated Muslims have praised D. Masson's French translation of the Qur'an for having 'at last' written 'Dieu'³ instead of 'Allah'. The Vatican document points out the following: "Allah is the only word that Arabic-speaking Christians have for God." Muslims and Christians worship a single God. The Vatican document then undertakes a critical examination of the other false judgements made on Islam.

'Islamic fatalism' is a widely-spread prejudice; the document examines this and quoting the Qur'an for support, it puts in opposition to this the notion of the responsibility man has, who is to be judged by his actions. It shows that the concept of an Islamic legalism is false; on the contrary, it opposes the sincerity of faith to this by quoting two phrases in the Qur'an that are highly misunderstood in the West:

"There is no compulsion in religion" (2:256)

"(God) has not laid upon you in religion any hardship" (22:78)

The document opposes the widely-spread notion of 'Islam, religion of fear' to 'Islam, religion of love, love of one's neighbor based on faith in God. It refutes the falsely spread notion that Muslim morality hardly exists and the other notion, shared by so many Jews and Christians, of Islamic fanaticism. It makes the following comment on this: "In fact, Islam was hardly any more fanatical during its history than the sacred bastions of Christianity whenever the Christian faith took on, as it were, a political value."

At this point, the authors quote expressions from the Qur'an that show how, in the West, the expression 'Holy War'⁴ has been mistranslated; "in Arabic it is *Al Jihad Fi Sabil Allah*, the effort on God's road", "the effort to spread Islam and defend it against its aggressors." The Vatican document continues as follows: "The Jihad is not at all the Biblical Kherem; it does not lead to extermination, but to the spreading of God's and man's rights to new lands.", "The past violence of the Jihad generally followed the rules of war; at the time of the Crusades moreover, it was not always the Muslims that perpetrated the worst slaughters."

Finally, the document deals with the prejudice according to which "Islam is a hidebound religion which keeps its followers in a kind of superannuated Middle Ages, making them unfit to adapt to the technical conquests of the modern age." It compares analogous situations observed in Christian countries and states the following: "we find...in the traditional expansion of Muslim thought, a principle of possible evolution in civilian society."

I am certain that this defense of Islam by the Vatican will surprise many believers today, be they Muslims, Jews or Christians. It is a demonstration of sincerity and open-mindedness that is singularly in

contrast with the attitudes inherited from the past. The number of people in the West who are aware of the new attitudes adopted by the highest authorities in the Catholic Church is however very small.

Once one is aware of this fact, it comes as less of a surprise to learn of the actions that sealed this reconciliation: firstly, there was the official visit made by the President of the Office for Non-Christian Affairs at the Vatican to King Faisal of Saudi Arabia; then the official reception given by Pope Paul VI to the Grand Ulema of Saudi Arabia in the course of 1974. Henceforth, one understands more clearly the spiritual significance of the fact that His Grace Bishop Elchinger received the Grand Ulema at his cathedral in Strasbourg and invited them during their visit to pray in the choir. This they did before the altar, turned towards Makkah.

Thus the representatives of the Muslim and Christian worlds at their highest level, who share a faith in the same God and a mutual respect for their differences of opinion, have agreed to open a dialogue. This being so, it is surely quite natural for other aspects of each respective Revelation to be confronted. The subject of this confrontation is the examination of the Scriptures in the light of scientific data and knowledge concerning the authenticity of the texts.

This examination is to be undertaken for the Qur'an as it was for the Judeo-Christian Revelation. The relationship between religions and science has not always been the same in any one place or time. It is a fact that there is no writing belonging to a monotheistic religion that condemns science. In practice however, it must be admitted that scientists have had great difficulties with the religious authorities of certain creeds. For many centuries, in the Christian world, scientific development was opposed by the authorities in question, on their own initiative and without reference to the authentic Scriptures.

We already know the measures taken against those who sought to enlarge science, measures which often made scientists go into exile to avoid being burnt at the stake, unless they recanted, changed their attitude and begged for pardon. The case of Galileo is always cited in this context: he was tried for having accepted the discoveries made by Copernicus on the rotation of the Earth. Galileo was condemned as the result of a mistaken interpretation of the Bible, since not a single Scripture could reasonably be brought against him.

In the case of Islam, the attitude towards science was, generally speaking, quite different. Nothing could be clearer than the famous Hadith of the Prophet: "Seek for science, even in China", or the other Hadith which says that the search for knowledge is a strict duty for every Muslim man and woman. As we shall see further on in this section, another crucial fact is that the Qur'an, while inviting us to cultivate science, itself contains many observations on natural phenomena and includes explanatory details which are seen to be in total agreement with modern scientific data. There is no equal to this in the Judeo-Christian Revelation.

It would nevertheless be wrong to imagine that, in the history of Islam, certain believers had never harbored a different attitude towards science. It is a fact that, at certain periods, the obligation to educate

oneself and others was rather neglected. It is equally true that in the Muslim world, as elsewhere, an attempt was sometimes made to stop scientific development.

All the same it will be remembered that at the height of Islam, between the Eighth and Twelfth centuries A.D., i.e. at a time when restrictions on scientific development were in force in the Christian world, a very large number of studies and discoveries were being made at Islamic universities. It was there that the remarkable cultural resources of the time were to be found.

The Calif's library at Cordoba contained 400,000 volumes. Averroës was teaching there, and Greek, Indian and Persian sciences were taught. This is why scholars from all over Europe went to study at Cordoba, just as today people go to the United States to perfect their studies. A very great number of ancient manuscripts have come down to us thanks to cultivated Arabs who acted as the vehicle for the culture of conquered countries. We are also greatly indebted to Arabic culture for mathematics (algebra was an Arabic invention), astronomy, physics (optics), geology, botany, medicine (Avicenna) etc.

For the very first time, science took on an international character in the Islamic universities of the Middle Ages. At this time, men were more steeped in the religious spirit than they are today, but in the Islamic world, this did not prevent them from being both believers and scientists. Science was the twin of religion and it should never have ceased to be so.

The Medieval period was, for the Christian world, a time of stagnation and absolute conformity. It must be stressed that scientific research was not slowed down by the Judeo-Christian Revelation itself, but rather by those people who claimed to be its servants. Following the Renaissance, the scientists' natural reaction was to take vengeance on their former enemies; this vengeance still continues today, to such an extent indeed that in the West, anyone who talks of God in scientific circles really does stand out. This attitude affects the thinking of all young people who receive a university education, Muslims included.

Their thinking could hardly be different from what it is considering the extreme positions adopted by the most eminent scientists. A Nobel Prize winner for Medicine has tried in the last few years to persuade people, in a book intended for mass publication, that living matter was able to create itself by chance from several basic components. Starting, he says, with this primitive living matter, and under the influence of various external circumstances, organized living beings were formed, resulting in the formidable complex being that constitutes man.

Surely these marvels of contemporary scientific knowledge in the field of life should lead a thinking person to the opposite conclusion. The organization presiding over the birth and maintenance of life surely appears more and more complicated as one studies it; the more details one knows, the more admiration it commands.

A knowledge of this organization must surely lead one to consider as less and less probable the part chance has to play in the phenomenon of life. The further one advances along the road to knowledge,

especially of the infinitely small, the more eloquent are the arguments in favor of the existence of a Creator.

Instead of being filled with humility in the face of such facts, man is filled with arrogance. He sneers at any idea of God, in the same way he runs down anything that detracts from his pleasure and enjoyment. This is the image of the materialist society that is flourishing at present in the West.

What spiritual forces can be used to oppose this pollution of thought practiced by many contemporary scientists? Judaism and Christianity make no secret of their inability to cope with the tide of materialism and invasion of the West by atheism. Both of them are completely taken off guard, and from one decade to the next one can surely see how seriously diminished their resistance is to this tide that threatens to sweep everything away.

The materialist atheist sees in classic Christianity nothing more than a system constructed by men over the last two thousand years designed to ensure the authority of a minority over their fellow men. He is unable to find in Judeo-Christian writings any language that is even vaguely similar to his own; they contain so many improbabilities, contradictions and incompatibilities with modern scientific data, that he refuses to take texts into consideration that the vast majority of theologians would like to see accepted as an inseparable whole.

When one mentions Islam to the materialist atheist, he smiles with a complacency that is only equal to his ignorance of the subject. In common with the majority of western intellectuals, of whatever religious persuasion, he has an impressive collection of false notions about Islam.

One must, on this point, allow him one or two excuses: Firstly, apart from the newly adopted attitudes prevailing among the highest Catholic authorities, Islam has always been subject in the West to a so-called 'secular slander'. Anyone in the West who has acquired a deep knowledge of Islam knows just to what extent its history, dogma, and aims have been distorted. One must also take into account the fact that documents published in European languages on this subject (leaving aside highly specialized studies) do not make the work of a person willing to learn any easier.

A knowledge of the Islamic Revelation is indeed fundamental from this point of view. Unfortunately, passages from the Qur'an, especially those relating to scientific data, are badly translated and interpreted, so that a scientist has every right to make criticisms—with apparent justification—that the Book does not actually deserve at all.

This detail is worth noting henceforth: inaccuracies in translation or erroneous commentaries (the one is often associated with the other), which would not have surprised anybody one or two centuries ago, offend today's scientists. When faced with a badly translated phrase containing a scientifically unacceptable statement, the scientist is prevented from taking the phrase into serious consideration. In the chapter on human reproduction, a very typical example will be given of this kind of error.

Why do such errors in translation exist? They may be explained by the fact that modern translators often take up, rather uncritically, the interpretations given by older commentators. In their day, the latter had an excuse for having given an inappropriate definition to an Arabic word containing several possible meanings; they could not possibly have understood the real sense of the word or phrase which has only become clear in the present day thanks to scientific knowledge.

In other words, the problem is raised of the necessary revision of translations and commentaries. It was not possible to do this at a certain period in the past, but nowadays we have knowledge that enables us to render their true sense. These problems of translation are not present for the texts of the Judeo-Christian Revelation. The case described here is absolutely unique to the Qur'an.

These scientific considerations, which are very specific to the Qur'an, greatly surprised me at first. Up until then, I had not thought it possible for one to find so many statements in a text compiled more than thirteen centuries ago referring to extremely diverse subjects and all of them totally in keeping with modern scientific knowledge. In the beginning, I had no faith whatsoever in Islam. I began this examination of the texts with a completely open mind and a total objectivity.

If there was any influence acting upon me, it was gained from what I had been taught in my youth; people did not speak of Muslims, but of 'Muhammadans', to make it quite clear that what was meant was a religion founded by a man and which could not therefore have any kind of value in terms of God.

Like many in the West, I could have retained the same false notions about Islam; they are so widely-spread today, that I am indeed surprised when I come across anyone, other than a specialist, who can talk in an enlightened manner on this subject. I therefore admit that before I was given a view of Islam different from the one received in the West, I was myself extremely ignorant.

I owe the fact that I was able to realize the false nature of the judgements generally made in the West about Islam to exceptional circumstances. It was in Saudi Arabia itself that an inkling was given to me of the extent to which opinions held in the West on this subject are liable to error.

The debt of gratitude I owe to the late King Faisal, whose memory I salute with deepest respect, is indeed very great: the fact that I was given the signal honour of hearing him speak on Islam and was able to raise with him certain problems concerning the interpretation of the Qur'an in relation to modern science is a very cherished memory. It was an extremely great privilege for me to have gathered so much precious information from him personally and those around him.

Since I had now seen the wide gap separating the reality of Islam from the image we have of it in the West, I experienced a great need to learn Arabic (which I did not speak) to be sufficiently well-equipped to progress in the study of such a misunderstood religion. My first goal was to read the Qur'an and to make a sentence by-sentence analysis of it with the help of various commentaries essential to a critical study.

My approach was to pay special attention to the description of numerous natural phenomena given in the Qur'an; the highly accurate nature of certain details referring to them in the Book, which was only apparent in the original, struck me by the fact that they were in keeping with present-day ideas, although a man living at the time of Muhammad could not have suspected this at all. I subsequently read several works written by Muslim authors on the scientific aspects of the Qur'anic text: they were extremely helpful in my appreciation of it, but I have not so far discovered a general study of this subject made in the West.

What initially strikes the reader confronted for the first time with a text of this kind is the sheer abundance of subjects discussed: the Creation, astronomy, the explanation of certain matters concerning the earth, and the animal and vegetable kingdoms, human reproduction.

Whereas monumental errors are to be found in the Bible, I could not find a single error in the Qur'an. I had to stop and ask myself: if a man was the author of the Qur'an, how could he have written facts in the Seventh century A.D. that today are shown to be in keeping with modern scientific knowledge?

There was absolutely no doubt about it: the text of the Qur'an we have today is most definitely a text of the period, if I may be allowed to put it in these terms (in the next chapter of the present section of the book I shall be dealing with this problem).

What human explanation can there be for this observation? In my opinion there is no explanation; there is no special reason why an inhabitant of the Arabian Peninsula should, at a time when King Dagobert was reigning in France (629–639 A.D.), have had scientific knowledge on certain subjects that was ten centuries ahead of our own.

It is an established fact that at the time of the Qur'anic Revelation, i.e. within a period of roughly twenty years straddling Hegira (622 A.D.), scientific knowledge had not progressed for centuries and the period of activity in Islamic civilization, with its accompanying scientific upsurge, came after the close of the Qur'anic Revelation.

Only ignorance of such religious and secular data can lead to the following bizarre suggestion I have heard several times: if surprising statements of a scientific nature exist in the Qur'an, they may be accounted for by the fact that Arab scientists were so far ahead of their time and Muhammad was influenced by their work.

Anyone who knows anything about Islamic history is aware that the period of the Middle Ages which saw the cultural and scientific upsurge in the Arab world came after Muhammad, and would not therefore indulge in such whims. Suggestions of this kind are particularly off the mark because the majority of scientific facts which are either suggested or very clearly recorded in the Qur'an have only been confirmed in modern times.

It is easy to see therefore how for centuries commentators on the Qur'an (including those writing at the

height of Islamic culture) have inevitably made errors of interpretation in the case of certain verses whose exact meaning could not possibly have been grasped. It was not until much later, at a period not far from our own, that it was possible to translate and interpret them correctly.

This implies that a thorough linguistic knowledge is not in itself sufficient to understand these verses from the Qur'an. What is needed along with this is a highly diversified knowledge of science. A study such as the present one embraces many disciplines and is in that sense encyclopaedic. As the questions raised are discussed, the variety of scientific knowledge essential to the understanding of certain verses of the Qur'an will become clear.

The Qur'an does not aim at explaining certain laws governing the Universe, however; it has an absolutely basic religious objective. The descriptions of Divine Omnipotence are what principally incite man to reflect on the works of Creation. They are accompanied by references to facts accessible to human observation or to laws defined by God who presides over the organization of the universe both in the sciences of nature and as regards man.

One part of these assertions is easily understood, but the meaning of the other can only be grasped if one has the essential scientific knowledge it requires. This means that in former times, man could only distinguish an apparent meaning which led him to draw the wrong conclusions on account of the inadequacy of his knowledge at the time in question.

It is possible that the choice of verses from the Qur'an which are to be studied for their scientific content may perhaps seem too small for certain Muslim writers who have already drawn attention to them before I have. In general, I believe I have retained a slightly smaller number of verses than they have. On the other hand, I have singled out several verses which until now have not, in my opinion, been granted the importance they deserve from a scientific point of view.

Wherever I may have mistakenly failed to take verses into consideration for this study that were selected by these writers, I hope that they will not hold it against me. I have also found, on occasion, that certain books contain scientific interpretations which do not appear to me to be correct; it is with an open mind and a clear conscience that I have provided personal interpretations of such verses.

By the same token, I have tried to find references in the Qur'an to phenomena accessible to human comprehension but which have not been confirmed by modern science. In this context, I think I may have found references in the Qur'an to the presence of planets in the Universe that are similar to the Earth. It must be added that many scientists think this is a perfectly feasible fact, although modern data cannot provide any hint of certainty. I thought I owed it to myself to mention this, whilst retaining all the attendant reservations that might be applied.

Had this study been made thirty years ago, it would have been necessary to add another fact predicted by the Qur'an to what would have been cited concerning astronomy, this fact is the conquest of space. At that time, subsequent to the first trials of ballistic missiles, people imagined a day when man would

perhaps have the material possibility of leaving his earthly habitat and exploring space. It was then known that a verse existed in the Qur'an predicting how one day man would make this conquest. This statement has now been verified.

The present confrontation between Holy Scripture and science brings ideas into play, both for the Bible and the Qur'an, which concern scientific truth. For this confrontation to be valid, the scientific arguments to be relied upon must be quite soundly established and must leave no room for doubt.

Those who balk at the idea of accepting the intervention of science in an appreciation of the Scriptures deny that it is possible for science to constitute a valid term of comparison (whether it be the Bible, which does not escape the comparison unscathed and we have seen why or the Qur'an, which has nothing to fear from science). Science, they say, is changing with the times and a fact accepted today may be rejected later.

This last comment calls for the following observation: a distinction must be drawn between scientific theory and duly controlled observed fact. Theory is intended to explain a phenomenon or a series of phenomena not readily understandable. In many instances theory changes: it is liable to be modified or replaced by another theory when scientific progress makes it easier to analyze facts and envisage a more viable explanation.

On the other hand, an observed fact checked by experimentation is not liable to modification: it becomes easier to define its characteristics, but it remains the same. It has been established that the Earth revolves around the Sun and the Moon around the Earth, and this fact will not be subject to revision; all that may be done in the future is to define the orbits more clearly.

A regard for the changing nature of theory is, for example, what made me reject a verse from the Qur'an thought by a Muslim physicist to predict the concept of antimatter, a theory which is at present the subject of much debate. One can, on the other hand, quite legitimately devote great attention to a verse from the Qur'an describing the aquatic origins of life, a phenomenon we shall never be able to verify, but which has many arguments that speak in its favor.

As for observed facts such as the evolution of the human embryo, it is quite possible to confront different stages described in the Qur'an with the data of modern embryology and find complete concordance between modern science and the verses of the Qur'an referring to this subject.

This confrontation between the Qur'an and science has been completed by two other comparisons: one is the confrontation of modern knowledge with Biblical data on the same subjects; and the other is the comparison from the same scientific point of view between the data in the Qur'an, the Book of Revelation transmitted by God to the Prophet, and the data in the *Ahadith*, books narrating the deeds and sayings of Muhammad that lie outside the written Revelation.

At the end of this, the third section of the present work, the detailed results of the comparison between

the Biblical and Qur'anic description of a single event are given, along with an account of how the passage fared when subjected to the scientific criticism of each description. An examination has, for example, been made in the case of the Creation and of the Flood.

In each instance, the incompatibilities with science in the Biblical description have been made clear. Also to be seen is the complete agreement between science and the descriptions in the Qur'an referring to them. We shall note precisely those differences that make one description scientifically acceptable in the present day and the other unacceptable.

This observation is of prime importance, since in the West, Jews, Christians and Atheists are unanimous in stating (without a scrap of evidence however) that Muhammad wrote the Qur'an or had it written as an imitation of the Bible. It is claimed that stories of religious history in the Qur'an resume Biblical stories.

This attitude is as thoughtless as saying that Jesus Himself duped His contemporaries by drawing inspiration from the Old Testament during His preachings: the whole of Matthew's Gospel is based on this continuation of the Old Testament, as we have indeed seen already.

What expert in exegesis would dream of depriving Jesus of his status as God's envoy for this reason? This is nevertheless the way that Muhammad is judged more often than not in the West: "all he did was to copy the Bible". It is a summary judgement that does not take account of the fact that the Qur'an and the Bible provide different versions of a single event.

People prefer not to talk about the difference in the descriptions. They are pronounced to be the same and thus scientific knowledge need not be brought in. We shall enlarge on these problems when dealing with the description of the Creation and the Flood.

The collections of *Ahadith* are to Muhammad what the Gospels are to Jesus: descriptions of the actions and sayings of the Prophet. Their authors were not eyewitnesses (This applies at least to the compilers of the collections of *Ahadith* which are said to be the most authentic and were collected much later than the time when Muhammad was alive). They do not in any way constitute books containing the written Revelation. They are not the word of God, but the sayings of the Prophet.

In these books, which are very widely read, statements are to be found containing errors from a scientific point of view, especially medical remedies. We naturally discount anything relating to problems of a religious kind, since they are not discussed here in the context of the *Ahadith*. Many *Ahadith* are of doubtful authenticity, they are discussed by Muslim scientists themselves.

When the scientific nature of one of the *Ahadith* is touched upon in the present work, it is essentially to put into relief all that distinguishes them from the Qur'an itself when seen from this point of view, since the latter does not contain a single scientific statement that is unacceptable. The difference, as we shall see, is quite startling.

The above observation makes the hypothesis advanced by those who see Muhammad as the author of the Qur'an quite untenable. How could a man, from being illiterate, become the most important author, in terms of literary merit, in the whole of Arabic literature? How could he then pronounce truths of a scientific nature that no other human being could possibly have developed at the time, and all this without once making the slightest error in his pronouncements on the subject?

The ideas in this study are developed from a purely scientific point of view. They lead to the conclusion that it is inconceivable for a human being living in the Seventh century A.D. to have made statements in the Qur'an on a great variety of subjects that do not belong to his period and for them to be in keeping with what was to be known only centuries later. For me, there can be no human explanation to the Qur'an.

2) Authenticity of the Qur'an, How It Came To Be Written

Thanks to its undisputed authenticity, the text of the Qur'an holds a unique place among the books of Revelation, shared neither by the Old nor the New Testament.

In the first two sections of this work, a review was made of the alterations undergone by the Old Testament and the Gospels before they were handed down to us in the form we know today. The same is not true for the Qur'an for the simple reason that it was written down at the time of the Prophet; we shall see how it came to be written, i.e. the process involved.

In this context, the differences separating the Qur'an from the Bible are in no way due to questions essentially concerned with date. Such questions are constantly put forward by certain people without regard to the circumstances prevailing at the time when the Judeo-Christian and the Qur'anic Revelations were written; they have an equal disregard for the circumstances surrounding the transmission of the Qur'an to the Prophet.

It is suggested that a Seventh century text had more likelihood of coming down to us unaltered than other texts that are as many as fifteen centuries older. This comment, although correct, does not constitute a sufficient reason; it is made more to excuse the alterations made in the Judeo-Christian texts in the course of centuries than to underline the notion that the text of the Qur'an, which was more recent, had less to fear from being modified by man.

In the case of the Old Testament, the sheer number of authors who tell the same story, plus all the revisions carried out on the text of certain books from the pre-Christian era, constitute as many reasons for inaccuracy and contradiction. As for the Gospels, nobody can claim that they invariably contain faithful accounts of Jesus's words or a description of his actions strictly in keeping with reality. We have seen how successive versions of the texts showed a lack of definite authenticity and moreover that their authors were not eyewitnesses.

Also to be underlined is the distinction to be made between the Qur'an, a book of written Revelation, and the *Ahadith*, collections of statements concerning the actions and sayings of Muhammad. Some of the Prophet's companions started to write them down from the moment of his death. As an element of human error could have slipped in, the collection had to be resumed later and subjected to rigorous criticism so that the greatest credit is in practice given to documents that came along after Muhammad.

Their authenticity varies, like that of the Gospels. Not a single Gospel was written down at the time of Jesus (they were all written long after his earthly mission had come to an end), and not a single collection of *Ahadith* was compiled during the time of the Prophet.

The situation is very different for the Qur'an. As the Revelation progressed, the Prophet and the believers following him recited the text by heart and it was also written down by the scribes in his following. It therefore starts off with two elements of authenticity that the Gospels do not possess. This continued up to the Prophet's death. At a time when not everybody could write, but everyone was able to recite, recitation afforded a considerable advantage because of the double-checking possible when the definitive text was compiled.

The Qur'anic Revelation was made by Archangel Gabriel to Muhammad. It took place over a period of more than twenty years of the Prophet's life, beginning with the first verses of Surah 96, then resuming after a three-year break for a long period of twenty years up to the death of the Prophet in 632 A.D., i.e. ten years before Hegira and ten years after Hegira.⁵

The following was the first Revelation⁶.

***“Read: In the name of thy Lord who created, Who created man from something which clings
Read! Thy Lord is the most Noble Who taught by the pen Who taught man what he did not
know.”(96: 1–5)***

Professor Hamidullah notes in the Introduction to his French translation of the Qur'an that one of the themes of this first Revelation was the 'praise of the pen as a means of human knowledge' which would 'explain the Prophet's concern for the preservation of the Qur'an in writing.'

Texts formally prove that long before the Prophet left Makkah for Madinah (i.e. long before Hegira), the Qur'anic text so far revealed had been written down. We shall see how the Qur'an is authentic in this. We know that Muhammad and the Believers who surrounded him were accustomed to reciting the revealed text from memory. It is therefore inconceivable for the Qur'an to refer to facts that did not square with reality because the latter could so easily be checked with people in the Prophet's following, by asking the authors of the transcription.

Four Surahs dating from a period prior to Hegira refer to the writing down of the Qur'an before the Prophet left Makkah in 622 (Surah 80, verses 11 to 16):

“By no means! Indeed it is a message of instruction Therefore whoever wills, should remember. On leaves held in honour Exalted, purified In the hands of scribes Noble and pious.” (80: 11–16)

Yusuf Ali, in the commentary to his translation, 1934, wrote that when the Revelation of this Surah as made, forty two or forty five others had been written and were kept by Muslims in Makkah (out of a total of 114).

“Nay, this is a glorious reading. [7](#) On a preserved tablet” (85:21–22)

“This is a glorious reading.⁵² In a book well-kept Which none but the purified teach. This is a Revelation from the Lord of the Worlds.”(56:77–80)

“They said: Tales of the ancients which he has caused to be written and they are dictated to him morning and evening.”(25:5)

Here we have a reference to the accusations made by the Prophet's enemies who treated him as an imposter. They spread the rumour that stories of antiquity were being dictated to him and he was writing them down or having them transcribed (the meaning of the word is debatable, but one must remember that Muhammad was illiterate). However this may be, the verse refers to this act of making a written record which is pointed out by Muhammad's enemies themselves.

A Surah that came after Hegira makes one last mention of the leaves on which these divine instructions were written:

“An (apostle) from God recites leaves Kept pure where are decrees right and straight.” (98:2–3)

The Qur'an itself therefore provides indications as to the fact that it was set down in writing at the time of the Prophet. It is a known fact that there were several scribes in his following, the most famous of whom, Zaid Ibn Thabit, has left his name to posterity.

In the preface to his French translation of the Qur'an (1971), Professor Hamidullah gives an excellent description of the conditions that prevailed when the text of the Qur'an was written, lasting up until the time of the Prophet's death:

“The sources all agree in stating that whenever a fragment of the Qur'an was revealed, the Prophet called one of his literate companions and dictated it to him, indicating at the same time the exact position of the new fragment in the fabric of what had already been received. Descriptions note that Muhammad asked the scribe to reread to him what had been dictated so that he could correct any deficiencies. Another famous story tells how every year in the month of Ramadan, the Prophet would recite the whole of the Qur'an (so far revealed) to Gabriel, that in the Ramadan preceding Muhammad's death, Gabriel had made him recite it twice. It is known how since the Prophet's time, Muslims acquired the habit of keeping vigil during Ramadan, and of reciting the whole of the Qur'an in addition to the usual prayers expected of them. Several sources add that Muhammad's scribe Zaid was present at this final bringing

together of the texts. Elsewhere, numerous other personalities are mentioned as well.”

Extremely diverse materials were used for this first record: parchment, leather, wooden tablets, camels' scapula, soft stone for inscriptions, etc. At the same time however, Muhammad recommended that the faithful learn the Qur'an by heart. They did this for a part if not all of the text recited during prayers. Thus there were *Hafizun* who knew the whole of the Qur'an by heart and spread it abroad. The method of doubly preserving the text both in writing and by memorization proved to be extremely precious.

Not long after the Prophet's death (632), his successor Abu Bakr, the first Caliph of Islam, asked Muhammad's former head scribe, Zaid Ibn Thabit, to make a copy. This he did. On Omar's initiative (the future second Caliph), Zaid consulted all the information he could assemble at Madinah: the witness of the *Hafizun*, copies of the Book written on various materials belonging to private individuals, all with the object of avoiding possible errors in transcription.

Thus an extremely faithful copy of the Book was obtained. The sources tell us that Caliph Omar, Abu Bakr's successor in 634, subsequently made a single volume *Mushaf* that he preserved and gave on his death to his daughter Hafsa, the Prophet's widow.

The third Caliph of Islam, Uthman, who held the caliphate from 644 to 655, entrusted a commission of experts with the preparation of the great recension that bears his name. It checked the authenticity of the document produced under Abu Bakr which had remained in Hafsa's possession until that time. The commission consulted Muslims who knew the text by heart.

The critical analysis of the authenticity of the text was carried out very rigorously. The agreement of the witnesses was deemed necessary before the slightest verse containing debatable material was retained. It is indeed known how some verses of the Qur'an correct others in the case of prescriptions: this may be readily explained when one remembers that the Prophet's period of apostolic activity stretched over twenty years (in round figures). The result is a text containing an order of Surahs that reflects the order followed by the Prophet in his complete recital of the Qur'an during Ramadan, as mentioned above.

One might perhaps ponder the motives that led the first three Caliphs, especially Uthman, to commission collections and recensions of the text. The reasons are in fact very simple: Islam's expansion in the very first decades following Muhammad's death was very rapid indeed and it happened among peoples whose native language was not Arabic. It was absolutely necessary to ensure the spread of a text that retained its original purity. Uthman's recension had this as its objective.

Uthman sent copies of the text of the recension to the centres of the Islamic Empire and that is why, according to Professor Hamidullah, copies attributed to Uthman exist in Tashkent and Istanbul. Apart from one or two possible mistakes in copying, the oldest documents known to the present day, that are to be found throughout the Islamic world, are identical; the same is true for documents preserved in Europe (there are fragments in the Bibliothèque Nationale in Paris which, according to the experts, date from the Eighth and Ninth centuries A.D., i.e. the Second and Third Hegirian centuries).

The numerous ancient texts that are known to be in existence all agree except for very minor variations which do not change the general meaning of the text at all. If the context sometimes allows more than one interpretation, it may well have to do with the fact that ancient writing was simpler than that of the present day.⁸

The 114 Surahs were arranged in decreasing order of length; there were nevertheless exceptions. The chronological sequence of the Revelation was not followed. In the majority of cases however, this sequence is known. A large number of descriptions are mentioned at several points in the text, sometimes giving rise to repetitions. Very frequently a passage will add details to a description that appears elsewhere in an incomplete form. Everything connected with modern science is, like many subjects dealt with in the Qur'an, scattered throughout the book without any semblance of classification.

3) The Creation of the Heavens and the Earth

Differences From And Resemblances To The Biblical Description

In contrast to the Old Testament, the Qur'an does not provide a unified description of the Creation. Instead of a continuous narration, there are passages scattered all over the Book which deal with certain aspects of the Creation and provide information on the successive events marking its development with varying degrees of detail. To gain a clear idea of how these events are presented, the fragments scattered throughout a large number of Surahs have to be brought together.

This dispersal throughout the Book of references to the same subject is not unique to the theme of the Creation. Many important subjects are treated in the same manner in the Qur'an: earthly or celestial phenomena, or problems concerning man that are of interest to scientists. For each of these themes, the same effort has been made here to bring all the verses together.

For many European commentators, the description of the Creation in the Qur'an is very similar to the one in the Bible and they are quite content to present the two descriptions side by side. I believe this concept is mistaken because there are very obvious differences. On subjects that are by no means unimportant from a scientific point of view, we find statements in the Qur'an whose equivalents we search for in vain in the Bible. The latter contains descriptions that have no equivalent in the Qur'an.

The obvious resemblances between the two texts are well known; among them is the fact that, at first glance, the number given to the successive stages of the Creation is identical: the six days in the Bible correspond to the six days in the Qur'an. In fact however, the problem is more complex than this and it is worth pausing to examine it.

The Six Periods of the Creation

There is absolutely no ambiguity whatsoever in the Biblical⁹ description of the Creation in six days

followed by a day of rest, the Sabbath, analogous with the days of the week. It has been shown how this mode of narration practiced by the priests of the Sixth century B.C. served the purpose of encouraging the people to observe the Sabbath. All Jews were expected to rest [10](#) on the Sabbath as the Lord had done after he had laboured during the six days of the week.

The way the Bible interprets it, the word 'day' means the interval of time between two successive sunrises or sunsets for an inhabitant of the Earth. When defined in this way, the day is conditioned by the rotation of the Earth on its own axis. It is obvious that logically-speaking there can be no question of 'days' as defined just now, if the mechanism that causes them to appear, i.e. the existence of the Earth and its rotation around the Sun, has not already been fixed in the early stages of the Creation according to the Biblical description. This impossibility has already been emphasized in the first part of the present book.

When we refer to the majority of translations of the Qur'an, we read that, analogous with the Biblical description, the process of the Creation for the Islamic Revelation also took place over a period of six days. It is difficult to hold against the translators the fact that they have translated the Arabic word by its most common meaning. This is how it is usually expressed in translations so that in the Qur'an, reads as follows:

“Your Lord is God Who created the heavens and the earth in six days.” (54:7)

There are very few translations and commentaries of the Qur'an that note how the word 'days' should really be taken to mean 'periods'. It has moreover been maintained that if the Qur'anic texts on the Creation divided its stages into 'days', it was with the deliberate intention of taking up beliefs held by all the Jews and Christians at the dawn of Islam and of avoiding a head-on confrontation with such a widely-held belief.

Without in any way wishing to reject this way of seeing it, one could perhaps examine the problem a little more closely and scrutinize in the Qur'an itself, and more generally in the language of the time, the possible meaning of the word that many translators themselves still continue to translate by the word 'day' *Yaum*, plural *Ayyam* in Arabic. [11](#)

Its most common meaning is 'day' but it must be stressed that it tends more to mean the diurnal light than the length of time that lapses between one day's sunset and the next. The plural *Ayyam* can mean, not just 'days', but also 'long length of time', an indefinite period of time (but always long). The meaning 'period of time' that the word contains is to be found elsewhere in the Qur'an. Hence the following:

“...in a period of time (Yaum) whereof the measure is a thousand years of your reckoning.” (32:5)

(It is to be noted that the Creation in six periods is precisely what the verse preceding verse 5 refers to).

“...in a period of time (Yaum) whereof the measure is 50,000 years.” (70:4)

The fact that the word, *Yaum* could mean a period of time that was quite different from the period that we mean by the word 'day' struck very early commentators who, of course, did not have the knowledge we possess today concerning the length of the stages in the formation of the Universe.

In the Sixteenth century A.D. for example, Abu Al Su'ud, who could not have had any idea of the day as defined astronomically in terms of the Earth's rotation, thought that for the Creation a division must be considered that was not into days as we usually understand the word, but into 'events' (in Arabic *Nauba*).

Modern commentators have gone back to this interpretation. Yusuf Ali (1934), in his commentary on each of the verses that deals with the stages in the Creation, insists on the importance of taking the word, elsewhere interpreted as meaning 'days', to mean in reality 'very long Periods, or Ages, or Aeons'.

It is therefore possible to say that in the case of the Creation of the world, the Qur'an allows for long periods of time numbering six. It is obvious that modern science has not permitted man to establish the fact that the complicated stages in the process leading to the formation of the Universe numbered six, but it has clearly shown that long periods of time were involved compared to which 'days' as we conceive them would be ridiculous.

One of the longest passages of the Qur'an, which deals with the Creation, describes the latter by juxtaposing an account of earthly events and one of celestial events. The verses in question are verses 9 to 12, Surah 41: (God is speaking to the Prophet)

“Say. Do you disbelieve Him Who created the earth in two periods? Do you ascribe equals to Him. He is the Lord of the Worlds. “He set in the (earth) mountains standing firm. He blessed it. He measured therein its sustenance in four periods, in due proportion, in accordance with the needs of those who ask for (sustenance? or information?). “Moreover (Thumma) He turned to heaven when it was smoke and said to it and to the earth: come willingly or unwillingly! They said: we come in willing obedience. “Then He ordained them seven heavens in two periods, and He assigned to each heaven its mandate by Revelation. And We adorned the lower heaven with luminaries and provided it a guard. Such is the decree of the All Mighty, the Full of Knowledge.” (41:9–12)

These four verses of Surah 41 contain several points to which we shall return. The initially gaseous state of celestial matter and the highly symbolic definition of the number of heavens as seven. We shall see the meaning behind this figure. Also of a symbolic nature is the dialogue between God on the one hand and the primordial sky and earth on the other, here however it is only to express the submission of the Heavens and Earth, once they were formed, to divine orders.

Critics have seen in this passage a contradiction with the statement of the six periods of the Creation. By adding the two periods of the formation of the Earth to the four periods of the spreading of its sustenance to the inhabitants, plus the two periods of the formation of the Heavens, we arrive at eight periods. This would then be in contradiction with the six periods mentioned above.

In fact however, this text, which leads man to reflect on divine Omnipotence, beginning with the Earth and ending with the Heavens, provides two sections that are expressed by the Arabic word *Tumma*', translated by 'moreover', but which also means 'furthermore' or 'then'. The sense of a 'sequence' may therefore be implied referring to a sequence of events or a series of man's reflections on the events mentioned here.

It may equally be a simple reference to events juxtaposed without any intention of bringing in the notion of the one following the other. However this may be, the periods of the Creation of the Heavens may just as easily coincide with the two periods of the Earth's creation. A little later we shall examine how the basic process of the formation of the Universe is presented in the Qur'an and we shall see how it can be jointly applied to the Heavens and the Earth in keeping with modern ideas. We shall then realize how perfectly reasonable this way is of conceiving the simultaneous nature of the events here described.

There does not appear to be any contradiction between the passage quoted here and the concept of the formation of the world in six stages that is to be found in other texts in the Qur'an.

The Qur'an Does Not Lay Down A Sequence For The Creation Of The Earth And Heavens

In the two passages from the Qur'an quoted above, reference was made in one of the verses to the Creation of the Heavens and the Earth (Surah 7, verse 54), and elsewhere to the Creation of the Earth and the Heavens (Surah 41, verses 9–12). The Qur'an does not therefore appear to lay down a sequence for the Creation of the Heavens and the Earth. The number of verses in which the Earth is mentioned first is quite small, e.g. Surah 2, verse 29 and Surah 20, verse 4, where a reference is made to:

“Him Who created the earth and the high heavens” (2:29, 20:4)

The number of verses where the Heavens are mentioned before the Earth is, on the other hand, much larger: (Surah 7, verse 54; Surah 10, verse 3; Surah 11, verse 7; Surah 25, verse 59; Surah 32, verse 4; Surah 50, verse 38; Surah 57, verse 4; Surah 79, verses 27 to 33; Surah 91, verses 5 to 10).

In actual fact, apart from Surah 79, there is not a single passage in the Qur'an that lays down a definite sequence; a simple coordinating conjunction (*Wa*) meaning 'and' links two terms, or the word *Tumma* which, as has been seen in the above passage, can indicate either a simple juxtaposition or a sequence. There appears to me to be only one passage in the Qur'an where a definite sequence is plainly established between different events in the Creation. It is contained in Surah 79:

“Are you the harder to create or is it the heaven that (God) built? He raised its canopy and fashioned it with harmony. He made dark the night and he brought out the forenoon. And after that (Ba'da Dalika) He spread it out. There from he drew out its water and its pasture. And the mountains He has fixed firmly. Goods for you and your cattle.” (79:27–33)

This list of earthly gifts from God to man, which is expressed in a language suited to farmers or nomads on the Arabian Peninsula, is preceded by an invitation to reflect on the creation of the heavens. The reference to the stage when God spreads out the earth and renders it arable is very precisely situated in time after the alternating of night and day has been achieved. Two groups are therefore referred to here, one of celestial phenomena, and the other of earthly phenomena articulated in time.

The reference made here implies that the earth must necessarily have existed before being spread out and that it consequently existed when God created the Heavens. The idea of a concomitance therefore arises from the heavenly and earthly evolutions with the interlocking of the two phenomena. Hence, one must not look for any special significance in the reference in the Qur'anic text to the Creation of the Earth before the Heavens or the Heavens before the Earth: the position of the words does not influence the order in which the Creation took place, unless however it is specifically stated.

The Basic Process Of The Formation Of The Universe And The Resulting Composition Of The Worlds

The Qur'an presents in two verses a brief synthesis of the phenomena that constituted the basic process of the formation of the Universe.

“Do not the Unbelievers see that the heavens and the earth were joined together, then We clove them asunder and We got every living thing out of the water. Will they not then believe?” (21:30)

Surah 41, verse 11. God orders the Prophet to speak after inviting him to reflect on the subject of the earth's creation:

“Moreover (God) turned to the Heaven when it was smoke and said to it and to the earth...” (41:11)

There then follow the orders to submit, referred to earlier in the text. We shall come back to the aquatic origins of life and examine them along with other biological problems raised by the Qur'an. The important things to remember at present are the following.

The statement of the existence of a gaseous mass with fine particles, for this is how the word 'smoke' (*Dukan* in Arabic) is to be interpreted. Smoke is generally made-up of a gaseous substratum, plus, in more or less stable suspension, fine particles that may belong to solid and even liquid states of matter at high or low temperature;

The reference to a separation process (*Fatq*) of a primary single mass whose elements were initially fused together (*Ratq*). It must be noted that in Arabic '*Fatq*' is the action of breaking, diffusing, separating, and that '*Ratq*' is the action of fusing or binding together elements to make a homogenous whole.

This concept of the separation of a whole into several parts is noted in other passages of the Book with reference to multiple worlds. The first verse of the first Surah in the Qur'an proclaims, after the opening invocation, the following:

"In the name of God, the Beneficent, the Merciful", "Praise be to God, Lord of the Worlds." (1: 1)

The terms 'worlds' reappears dozens of times in the Qur'an. The Heavens are referred to as multiple as well, not only on account of their plural form, but also because of their symbolic numerical quantity, 7.

This number is used 24 times throughout the Qur'an for various numerical quantities. It often carries the meaning of 'many' although we do not know exactly why this meaning of the figure was used. The Greeks and Romans also seem to have used the number 7 to mean an undefined idea of plurality. In the Qur'an, the number 7 refers to the Heavens themselves (*Samawat*). It alone is understood to mean 'Heavens'. The 7 roads of the Heavens are mentioned once:

"(God) is the One Who created for you all that is on the earth. Moreover He turned to the heaven and fashioned seven heavens with harmony. He is Full of Knowledge of all things." (2:29)

"And We have created above you seven paths. We have never been unmindful of the Creation." (23: 17)

"(God) is the One Who created seven heavens one above another. Thou canst see no fault in the creation of the Beneficent. Turn the vision again! Canst thou see any rift?" (67:3)

"Did you see how God created seven heavens one above another and made the moon a light therein and made the sun a lamp?" (71: 15-16)

"We have built above you seven strong (heavens) and placed a blazing lamp." (78: 12)

Here the blazing lamp is the Sun. The commentators on the Qur'an are in agreement on all these verses: the number 7 means no more than plurality.¹³ There are therefore many Heavens and Earths, and it comes as no small surprise to the reader of the Qur'an to find that earths such as our own may be found in the Universe, a fact that has not yet been verified by man in our time.

Verse 12 of Surah 65 does however predict the following:

"God is the One Who created seven heavens and of the earth (Ard) a similar number. The Command descends among them so that you know that God has power over all things and comprehends all things in His knowledge." (65: 12)

Since 7 indicates an indefinite plurality (as we have seen), it is possible to conclude that the Qur'anic text clearly indicates the existence of more than one single Earth, our own Earth (*Ard*); there are others like it in the Universe. Another observation which may surprise the Twentieth century reader of the Qur'an is

the fact that verses refer to three groups of things created, i.e.

- Things in the Heavens.
- Things on the Earth
- Things between the Heavens and the Earth Here are several of these verses:

“To Him (God) belongs what is in the heavens, on earth, between them and beneath the soil.”
(20:6)

“...the One Who created the heavens, the earth and what is between them in six periods.” (25:59)

“God is the One Who created the heavens, the earth and what is between them in six periods.”
(32:4)

“We created the heavens, the earth and what is between them in six periods, and no weariness touched Us.”[14](#)***(50:38)***

The reference in the Qur'an to 'what is between the Heavens and the Earth' is again to be found in the following verses: Surah 21, verse 16; Surah 44, verses 7 and 38 ; Surah 78, verse 37; Surah 15, verse 85; Surah 46, verse 3; Surah 43, Verse 85.

This Creation outside the Heavens and outside the Earth, mentioned several times, is a priori difficult to imagine. To understand these verses, reference must be made to the most recent human observations on the existence of cosmic extra-galactic material and one must indeed go back to ideas established by contemporary science on the formation of the Universe, starting with the simplest and proceeding to the most complex. These are the subject of the following paragraph.

Before passing on to these purely scientific matters however, it is advisable to recapitulate the main points on which the Qur'an gives us information about the Creation. According to the preceding quotations, they are as follows:

- Existence of six periods for the Creation in general.
- Interlocking of stages in the Creation of the Heavens and the Earth.
- Creation of the Universe out of an initially unique mass forming a block that subsequently split up.
- Plurality of the Heavens and of the Earths.
- Existence of an intermediary creation 'between the Heavens and the Earth'.

Some Modern Scientific Data Concerning The Formation Of The Universe

The Solar System

The Earth and planets rotating around the Sun constitute an organized world of dimensions which, to our human scale, appear quite colossal. The Earth is, after all, roughly 93 million miles from the Sun. This is a very great distance for a human being, but it is very small in comparison to the distance separating the Sun from the furthestmost planet from it in the solar system (Pluto); in round numbers it is 40 times the distance from the Earth to the Sun, i.e. approximately 3,672 million miles away.

This distance, when doubled, represents the largest dimension of our solar system. The Sun's light takes nearly 6 hours to reach Pluto, and yet the journey is made at the terrifying speed of over 186,000 miles per second. The light coming from stars on the very confines of the known celestial world therefore takes billions of years to reach us.

The Galaxies

The Sun, of which we are a satellite like the other planets surrounding it, is itself an infinitesimally small element among a hundred billion stars that form a whole, called a galaxy. On a fine summer night, the whole of space seems to be filled with stars that make up what is known as the Milky Way. This group has extremely large dimensions. Whereas light could cross the solar system in units of one hour, it would require something like 90,000 years to go from one extreme to the other of the most compact group of stars that make up our galaxy.

The galaxy that we belong to however, even though it is so incredibly huge, is only a small part of the Heavens. There are giant agglomerates of stars similar to the Milky Way that lie outside our galaxy. They were discovered a little over fifty years ago, when astronomy was able to make use of an optical instrument as sophisticated as the one that made possible the construction of the Mount Wilson telescope in the United States.

Thus a very large number indeed of isolated galaxies and masses of galaxies have been discovered that are so far away that it was necessary to institute a special unit of light-years, the 'parsec' (the distance light travels in 3.26 years at 186,000 miles per second).

Formation and Evolution of Galaxies, Stars and Planetary Systems

What was there originally in the immensely large space the galaxies now occupy? Modern science can only answer this question as of a certain period in the evolution of the Universe; it cannot put into numbers the length of time that separates this period from us.

At the earliest time it can provide us with, modern science has every reason to maintain that the Universe was formed of a gaseous mass principally composed of hydrogen and a certain amount of

helium that was slowly rotating. This nebula subsequently split up into multiple fragments with very large dimensions and masses, so large indeed, that specialists in astrophysics are able to estimate their mass from 1 to 100 billion times the present mass of the Sun (the latter represents a mass that is over 300,000 times that of the Earth). These figures give an idea of the large size of the fragments of primary gaseous mass that were to give birth to the galaxies.

A new fragmentation was to form the stars. There then followed the intervention of a condensing process where gravitational forces came into play, (since these bodies were moving and rotating more and more quickly), along with pressures and the influence of magnetic fields and of radiations. The stars became shiny as they contracted and transformed the gravitational forces into thermal energy.

Thermonuclear reactions came into play, and heavier atoms were formed by fusion at the expense of others that were lighter; this is how the transition was made from hydrogen to helium, then to carbon and oxygen, ending with metals and metalloids. Thus the stars have a life of their own and modern astronomy classifies them according to their present stage of evolution. The stars also have a death; in the final stage of their evolution, the violent implosion of certain stars has been observed so that they become veritable 'corpses'.

The planets, and in particular the Earth, originated in a separation process starting from an initial constituent that in the beginning was the primary nebula. A fact that has no longer been contested for over twenty-five years is that the Sun condensed inside the single nebula and that the planets did the same inside the surrounding nebular disc. One must stress and this is of prime importance for, the subject in hand that there was no sequence in the formation of the celestial elements such as the Sun nor in the formation of an earthly element. There is an evolutionary parallelism with the identity of origin.

Here, science can give us information on the period during which the events just mentioned took place. Having estimated the age of our galaxy at roughly ten billion years, according to this hypothesis, the formation of the solar system took place a little over five billion years later. The study of natural radio activity makes it possible to place the age of the Earth and the time the Sun was formed at 4.5 billion years ago, to within a present-day accuracy of 100 million years, according to some scientists' calculations. This accuracy is to be admired, since 100 million years may represent a long time to us but the ratio 'maximum error/total time-to-be-measured' is $0.1/4.5$, i.e. 2.2%.

Specialists in astrophysics have therefore attained a high degree of knowledge concerning the general process involved in the formation of the solar system. It may be summarized as follows: condensation and contraction of a rotating gaseous mass, splitting up into fragments that leave the Sun. and planets in their places, among them the Earth. [15](#)

The knowledge that science has gained on the primary nebula and the way it split up into an incommensurable quantity of stars grouped into galaxies leaves absolutely no doubt as to the legitimacy of a concept of the plurality of worlds. It does not however provide any kind of certainty concerning the

existence in the Universe of anything that might, either closely or vaguely, resemble the Earth.

The Concept of the Plurality of the Worlds

In spite of the above, modern specialists in astrophysics consider it highly likely that planets similar to Earth are present in the Universe. As far as the solar system is concerned, nobody seriously entertains the possibility of finding general conditions similar to those on Earth on another planet in this system. We must therefore seek for them outside the solar system. The likelihood of their existing outside it is considered quite probable for the following reasons:

It is thought that in our galaxy half of the 100 billion stars must, like the Sun, have a planetary system. The fifty billion stars do indeed, like the Sun, rotate very slowly. A characteristic which suggests that they are surrounded by planets that are their satellites. These stars are so far away that the possible planets are unobservable, but their existence is thought to be highly probable on account of certain trajectory characteristics; a slight undulation of the star's trajectory indicates the presence of a companion planetary satellite.

Thus the Barnard Star probably has at least one planetary companion with a mass greater than that of Jupiter and may even have two satellites. As P. Guérin writes: "All the evidence points to the fact that planetary systems are scattered in profusion all over the universe. The solar system and the Earth are not unique." And as a corollary: "Life, like the planets that harbour it, is scattered throughout the universe, in those places where the physico-chemical conditions necessary for its flowering and development are to be found."

Interstellar Material

The basic process in the formation of the Universe therefore lay in the condensation of material in the primary nebula followed by its division into fragments that originally constituted galactic masses. The latter in their turn split up into stars that provided the sub-product of the process, i.e. the planets. These successive separations left among the groups of principle elements what one might perhaps call 'remains'. Their more scientific name is 'interstellar galactic material'.

It has been described in various ways; there are bright nebulae that reflect the light received from other stars and are perhaps composed of 'dusts' or 'smokes', to use the terminology of experts in astrophysics, and then there are the dark nebulae that are less dense, consisting of interstellar material that is even more modest, known for its tendency to interfere with photometric measurements in astronomy. There can be no doubt about the existence of 'bridges' of material between the galaxies themselves.

Although these gases may be very rarefied, the fact that they occupy such a colossal space, in view of the great distance separating the galaxies, could make them correspond to a mass possibly greater than the total mass of the galaxies in spite of the low density of the former.

A. Boichot considers the presence of these intergalactic masses to be of prime importance which could “considerably alter ideas on the evolution of the Universe.” We must now go back to the basic ideas on the Creation of the Universe that were taken from the Qur'an and look at them in the light of modern scientific data.

Confrontation With The Data In The Qur'an Concerning The Creation

We shall examine the five main points on which the Qur'an gives information about the Creation.

The six periods of the Creation of the Heavens and the Earth covered, according to the Qur'an, the formation of the celestial bodies and the Earth, and the development of the latter until (with its 'sustenance') it became inhabitable by man. In the case of the Earth, the events described in the Qur'an happened over four periods. One could perhaps see in them the four geological periods described by modern science, with man's appearance, as we already know, taking place in the quaternary era.

This is purely a hypothesis since nobody has an answer to this question. It must be noted however, that the formation of the heavenly bodies and the Earth, as explained in verses 9 to 12, Surah 41 (see page 136) required two phases. If we take the Sun and its sub product the Earth as an example (the only one accessible to us), science informs us that their formation occurred by a process of condensation of the primary nebula and then their separation.

This is exactly what the Qur'an expresses very clearly when it refers to the processes that produced a fusion and subsequent separation starting from a celestial 'smoke'. Hence there is complete correspondence between the facts of the Qur'an and the facts of science.

Science showed the interlocking of the two stages in the formation of a star (like the Sun) and its satellite (like the Earth). This interconnection is surely very evident in the text of the Qur'an examined. The existence at an early stage of the Universe of the 'smoke' referred to in the Qur'an, meaning the predominantly gaseous state of the material that composes it, obviously corresponds to the concept of the primary nebula put forward by modern science.

The plurality of the heavens, expressed in the Qur'an by the number 7, whose meaning we have discussed, is confirmed by modern science due to the observations experts in astrophysics have made on galactic systems and their very large number. On the other hand the plurality of earths that are similar to ours (from certain points of view at least) is an idea that arises in the text of the Qur'an but has not yet been demonstrated to be true by science; all the same, specialists consider this to be quite feasible.

The existence of an intermediate creation between 'the Heavens' and 'the Earth' expressed in the Qur'an may be compared to the discovery of those bridges of material present outside organized astronomic systems. Although not all the questions raised by the descriptions in the Qur'an have been completely confirmed by scientific data, there is in any case absolutely no opposition between the data in the Qur'an on the Creation and modern knowledge on the formation of the Universe.

This fact is worth stressing for the Qur'anic Revelation, whereas it is very obvious indeed that the present-day text of the Old Testament provides data on the same events that are unacceptable from a scientific point of view. It is hardly surprising, since the description of the Creation in the Sacerdotal version of the Bible¹⁶ was written by priests at the time of the deportation to Babylon who had the legalist intentions already described and therefore compiled a description that fitted their theological views.

The existence of such an enormous difference between the Biblical description and the data in the Qur'an concerning the Creation is worth underlining once again on account of the totally gratuitous accusations levelled against Muhammad since the beginnings of Islam to the effect that he copied the Biblical descriptions.

As far as the Creation is concerned, this accusation is totally unfounded. How could a man living fourteen hundred years ago have made corrections to the existing description to such an extent that he eliminated scientifically inaccurate material and, on his own initiative, made statements that science has been able to verify only in the present day? This hypothesis is completely untenable. The description of the Creation given in the Qur'an is quite different from the one in the Bible.

Answers To Certain Objections

Indisputably, resemblances do exist between narrations dealing with other subjects, particularly religious history, in the Bible and in the Qur'an. It is moreover interesting to note from this point of view how nobody holds against Jesus the fact that he takes up the same sort of facts and Biblical teachings. This does not, of course, stop people in the West from accusing Muhammad of referring to such facts in his teaching with the suggestion that he is an imposter because he presents them as a Revelation.

As for the proof that Muhammad reproduced in the Qur'an what he had been told or dictated by the rabbis, it has no more substance than the statement that a Christian monk gave him a sound religious education. One would do well to re-read what R. Blachère in his book, *The Problem of Muhammad* (*Le Problème de Mahomet*)¹⁷, has to say about this 'fable'.

A hint of a resemblance is also advanced between other statements in the Qur'an and beliefs that go back a very long way, probably much further in time than the Bible. More generally speaking, the traces of certain cosmogonic myths have been sought in the Holy Scriptures; for example the belief held by the Polynesians in the existence of primeval waters that were covered in darkness until they separated when light appeared; thus Heaven and Earth were formed. This myth is compared to the description of the Creation in the Bible, where there is undoubtedly a resemblance. It would however be superficial to then accuse the Bible of having copied this from the cosmogonic myth.

It is just as superficial to see the Qur'anic concept of the division of the primeval material constituting the Universe at its initial stage, a concept held by modern science, as one that comes from various

cosmogonic myths in one form or another that express something resembling it. It is worth analysing these mythical beliefs and descriptions more closely.

Often an initial idea appears among them which is reasonable in itself, and is in some cases borne out by what we today know (or think we know) to be true, except that fantastic descriptions are attached to it in the myth. This is the case of the fairly widespread concept of the Heavens and the Earth originally being united then subsequently separated. When, as in Japan, the image of the egg plus an expression of chaos is attached to the above with the idea of a seed inside the egg (as for all eggs), the imaginative addition makes the concept lose all semblance of seriousness.

In other countries, the idea of a plant is associated with it; the plant grows and in so doing raises up the sky and separates the Heavens from the Earth. Here again, the imaginative quality of the added detail lends the myth its very distinctive character. Nevertheless a common characteristic remains, i.e. the notion of a single mass at the beginning of the evolutionary process leading to the formation of the Universe which then divided to form the various worlds that we know today.

The reason these cosmogonic myths are mentioned here is to underline the way they have been embroidered by man's imagination and to show the basic difference between them and the statements in the Qur'an on the same subject. The latter are free from any of the whimsical details accompanying such beliefs; on the contrary, they are distinguished by the sober quality of the words in which they are made and their agreement with scientific data. Such statements in the Qur'an concerning the Creation, which appeared nearly fourteen centuries ago, obviously do not lend themselves to a human explanation.

4) Astronomy in the Qur'an

The Qur'an is full of reflections on the Heavens. In the preceding chapter on the Creation, we saw how the plurality of the Heavens and Earths was referred to, as well as what the Qur'an calls an intermediary creation 'between the Heavens and the Earth', modern science has verified the latter. The verses referring to the Creation already contain a broad idea of what is to be found in the heavens, i.e. of everything outside the earth.

Apart from the verses that specifically describe the Creation, there are roughly another forty verses in the Qur'an which provide information on astronomy complementing what has already been given. Some of them are not much more than reflections on the glory of the Creator, the Organizer of all the stellar and planetary systems. These we know to be arranged according to balancing positions whose stability Newton explained in his law of the mutual attraction of bodies.

The first verses to be quoted here hardly furnish much material for scientific analysis: the aim is simply to draw attention to God's Omnipotence. They must be mentioned however to give a realistic idea of the way the Qur'anic text described the organization of the Universe fourteen centuries ago.

These references constitute a new fact of divine Revelation. The organization of the world is treated in neither the Gospels nor the Old Testament (except for a few notions whose general inaccuracy we have already seen in the Biblical description of the Creation). The Qur'an however deals with this subject in depth.

What it describes is important, but so is what it does not contain. It does not in fact provide an account of the theories prevalent at the time of the Revelation that deal with the organization of the celestial world, theories that science was later to show were inaccurate. An example of this will be given later. This negative consideration must however be pointed out. [18](#)

A) General Reflections Concerning The Sky

The subject is man in general.

“Do they not look at the sky above them, how We have built it and adorned it, and there are no rifts in it.” (50:6)

“(God) created the heavens without any pillars that you can see...” (31: 10)

“God is the One Who raised the heavens without any pillars that you can see, then He firmly established Himself on the throne and He subjected the sun and moon...” (13:2)

These two verses refute the belief that the vault of the heavens was held up by pillars, the only things preventing the former from crushing the earth.

“...the sky (God) raised it...” (55:7)

“(God) holds back the sky from falling on the earth unless by His leave...” (22:65)

It is known how the remoteness of celestial masses at great distance and in proportion to the magnitude of their mass itself constitutes the foundation of their equilibrium. The more remote the masses are, the weaker the force is that attracts one to the other. The nearer they are, the stronger the attraction is that one has to the other: this is true for the Moon, which is near to the Earth (astronomically speaking) and exercises an influence by laws of attraction on the position occupied by the waters of the sea, hence the phenomenon of the tides. If two celestial bodies come too close to one another, collision is inevitable. The fact that they are subjected to an order is the sine qua non for the absence of disturbances.

The subjection of the Heavens to divine order is often referred to as well: Surah 23, verse 86. God is speaking to the Prophet.

“Say: Who is Lord of the seven heavens and Lord of the tremendous throne?” (23:86)

We have already seen how by 'seven heavens' what is meant is not 7, but an indefinite number of

Heavens.

“For you (God) subjected all that is in the heavens and on the earth, all from Him. Behold! In that are signs for people who reflect.” (45: 13)

“The sun and moon (are subjected) to calculations” (55:5)

“(God) appointed the night for rest and the sun and the moon for reckoning.” (6:96)

“For you (God) subjected the sun and the moon, both diligently pursuing their courses. And for you He subjected the night and the day.” (14:33)

Here one verse completes another: the calculations referred to result in the regularity of the course described by the heavenly bodies in question, this is expressed by the word *Da'ib*, the present participle of a verb whose original meaning was 'to work eagerly and assiduously at something'. Here it is given the meaning of 'to apply oneself to something with care in a perseverant, invariable manner, in accordance with set habits'. God is speaking:

“And for the moon We have appointed mansions till she returns like an old shriveled palm branch.” (36:39)

This is a reference to the curled form of the palm branch which, as it shrivels up, takes on the moon's crescent. This commentary will be completed later.

“For you (God) subjected the night and the day, the sun and the moon; the stars are in subjection to His Command. Verily in this are signs for people who are wise.” (16: 12)

The practical angle from which this perfect celestial order is seen is underlined on account of its value as an aid to man's travel on earth and by sea, and to his calculation of time. This comment becomes clear when one bears in mind the fact that the Qur'an was originally a preaching addressed to men who only understood the simple language of their everyday lives. This explains the presence of the following reflections.

“(God) is the One Who has set out for you the stars, that you may guide yourselves by them through the darkness of the land and of the sea. We have detailed the signs for people who know.” (6:97)

“(God sets on the earth) landmarks and by the stars (men) guide themselves.” (16: 16)

“God is the One Who made the sun a shining glory and the moon a light and for her ordained mansions, so that you might know the number of years and the reckoning (of the time). God created this in truth. He explains the signs in detail for people who know.” (10:5)

This calls for some comment. Whereas the Bible calls the Sun and Moon 'lights', and merely adds to one

the adjective 'greater' and to the other 'lesser', the Qur'an ascribes differences other than that of dimension to each respectively. Agreed, this is nothing more than a verbal distinction, but how was one to communicate to men at this time without confusing them, while at the same time expressing the notion that the Sun and Moon were not absolutely identical 'lights'?

B) Nature Of Heavenly Bodies

The Sun And The Moon

The Sun is a shining glory (*Diya'*) and the Moon a light (*Nur*). This translation would appear to be more correct than those given by others, where the two terms are inverted. In fact there is little difference in meaning since *Diya'* belongs to a root (*Dw'*) which, according to Kazimirski's authoritative Arabic/French dictionary, means 'to be bright, to shine' (e.g. like a fire). The same author attributes to the substantive in question the meaning of 'light'.

The difference between Sun and Moon will be made clearer by further quotes from the Qur'an.

“Blessed is the One Who placed the constellations in heaven and placed therein a lamp and a moon giving light.” (25:61)

“Did you see how God created seven heavens one above an other and made the moon a light therein and made the sun a lamp?” (71: 15–16)

“We have built above you seven strong (heavens) and placed a blazing lamp.” (78: 12–13)

The blazing lamp is quite obviously the sun. Here the moon is defined as a body that gives light (*Munir*) from the same root as *Nur* (the light applied to the Moon). The Sun however is compared to a torch (*Siraj*) or a blazing (*Wahhaj*) lamp.

A man of Muhammad's time could easily distinguish between the Sun, a blazing heavenly body well known to the inhabitants of the desert, and the Moon, the body of the cool of the night. The comparisons found in the Qur'an on this subject are therefore quite normal. What is interesting to note here is the sober quality of the comparisons, and the absence in the text of the Qur'an of any elements of comparison that might have prevailed at the time and which in our day would appear as phantasmagoria.

It is known that the Sun is a star that generates intense heat and light by its internal combustions, and that the Moon, which does not give of light itself, and is an inert body (on its external layers at least) merely reflects the light received from the Sun. There is nothing in the text of the Qur'an that contradicts what we know today about these two celestial bodies.

The Stars

As we know, the stars are heavenly bodies like the Sun. They are the scene of various physical phenomena of which the easiest to observe is their generation of light. They are heavenly bodies that produce their own light. The word 'star' appears thirteen times in the Qur'an (*Najm*, plural *Nujum*); it comes from a root meaning to appear, to come into sight. The word designates a visible heavenly body without saying of what kind, i.e. either generator of light or mere reflector of light received. To make it clear that the object so designated is a star, a qualifying phrase is added as in the following Surah:

“By the sky and the Night-Visitor, who will tell thee what the Night-Visitor is, the Star of piercing brightness.”¹⁹ (86: 1–3)

The evening star is qualified in the Qur'an by the word *Takib* meaning 'that which pierces through something' (here the night shadows). The same word is moreover used to designate shooting stars (Surah 37, verse 10): the latter are the result of combustion.

The Planets

It is difficult to say whether these are referred to in the Qur'an with the same exact meaning that is given to the heavenly bodies in the present day. The planets do not have their own light. They revolve around the Sun, Earth being one of them. While one may presume that others exist elsewhere, the only ones known are those in the solar system.

Five planets other than Earth were known to the ancients: Mercury, Venus, Mars, Jupiter and Saturn. Three have been discovered in recent times: Uranus, Neptune and Pluto.

The Qur'an would seem to designate these by the word *Kaukab* (plural *Kawakib*) without stating their number. Joseph's dream (sum 12) refers to eleven of them, but the description is, by definition, an imaginary one. A good definition of the meaning of the word *Kaukab* in the Qur'an seems to have been given in a very famous verse.

The eminently spiritual nature of its deeper meaning stands forth, and is moreover the subject of much debate among experts in exegesis. It is nevertheless of great interest to offer an account of the comparison it contains on the subject of the word that would seem to designate a 'planet'. Here is the text in question:

“God is the light of the heavens and the earth. The similitude of His light is as if there were a niche and within it a luminary. The luminary is in a glass. The glass is as if it were a planet glittering like a pearl.” (24:35)

Here the subject is the projection of light onto a body that reflects it (glass) and gives it the glitter of a pearl, like a planet that is lit by the sun. This is the only explanatory detail referring to this word to be found in the Qur'an. The word is quoted in other verses. In some of them it is difficult to distinguish which

heavenly bodies are meant (Surah 6, verse 76; Surah 82, verses 1–2).

In one verse however, when seen in the light of modern science, it would seem very much that these can only be the heavenly bodies that we know to be planets. In Surah 37, verse 6, we see the following:

“We have indeed adorned the lowest heaven with an ornament, the planets.” (37:6)

Is it possible that the expression in the Qur'an 'lowest heaven' means the 'solar system'? It is known that among the celestial elements nearest to us, there are no other permanent elements apart from the planets: the Sun is the only star in the system that bears its name. It is difficult to see what other heavenly bodies could be meant if not the planets. The translation given would therefore seem to be correct and the Qur'an to refer to the existence of the planets as defined in modern times.

The Lowest Heaven

The Qur'an mentions the lowest heaven several times along with the heavenly bodies of which it is composed. The first among these would seem to be the planets, as we have just seen. When however the Qur'an associates material notions intelligible to us, enlightened as we are today by modern science, with statements of a purely spiritual nature, their meaning becomes obscure.

Thus the verse quoted could easily be understood, except that the following verse (7) of the same Surah 37 speaks of a 'guard against every rebellious evil spirit', 'guard' again being referred to in Surah 21, verse 32 and Surah 41, verse 12, so that we are confronted by statements of quite a different kind.

What meaning can one attach moreover to the 'projectiles for the stoning of demons' that according to verse 5, Surah 67 are situated in the lowest heaven? Do the 'luminaries' referred to in the same verse have something to do with the shooting stars mentioned above?²⁰ All these observations seem to lie outside the subject of this study. They have been mentioned here for the sake of completeness. At the present stage however, it would seem that scientific data are unable to cast any light on a subject that goes beyond human understanding.

C) Celestial Organization

The information the Qur'an provides on this subject mainly deals with the solar system. References are however made to phenomena that go beyond the solar system itself: they have been discovered in recent times. There are two very important verses on the orbits of the Sun and Moon:

“(God is) the One Who created the night, the day, the sun and the moon. Each one is travelling in an orbit with its own motion.” (21:33)

“The sun must not catch up the moon, nor does the night outstrip the day. Each one is traveling in an orbit with its own motion.” (36:40)

Here an essential fact is clearly stated: the existence of the Sun's and Moon's orbits, plus a reference is made to the traveling of these bodies in space with their own motion. A negative fact also emerges from a reading of these verses: it is shown that the Sun moves in an orbit, but no indication is given as to what this orbit might be in relation to the Earth.

At the time of the Qur'anic Revelation, it was thought that the Sun moved while the Earth stood still. This was the system of geocentrism that had held sway since the time of Ptolemy, Second century B.C., and was to continue to do so until Copernicus in the Sixteenth century A.D. Although people supported this concept at the time of Muhammad, it does not appear anywhere in the Qur'an, either here or elsewhere.

The Existence of the Moon's and the Sun's Orbits

The Arabic word *Falak* has here been translated by the word 'orbit', many French translators of the Qur'an attach to it the meaning of a 'sphere'. This is indeed its initial sense. Hamidullah translates it by the word 'orbit'. The word caused concern to older translators of the Qur'an who were unable to imagine the circular course of the Moon and the Sun and therefore retained images of their course through space that were either more or less correct, or hopelessly wrong.

Si Hamza Boubekour in his translation of the Qur'an cites the diversity of interpretations given to it: "A sort of axle, like an iron rod, that a mill turns around; a celestial sphere, orbit, sign of the zodiac, speed, wave...", but he adds the following observation made by Tabari, the famous Tenth century commentator: "It is our duty to keep silent when we do not know." (XVII, 15).

This shows just how incapable men were of understanding this concept of the Sun's and Moon's orbit. It is obvious that if the word had expressed an astronomical concept common in Muhammad's day, it would not have been so difficult to interpret these verses. A Dew concept therefore existed in the Qur'an that was not to be explained until centuries later.

The Moon's Orbit

Today, the concept is widely spread that the Moon is a satellite of the Earth around which it revolves in periods of twenty-nine days. A correction must however be made to the absolutely circular form of its orbit, since modern astronomy ascribes a certain eccentricity to this, so that the distance between the Earth and the Moon (240,000 miles) is only the average distance.

We have seen above how the Qur'an underlined the usefulness of observing the Moon's movements in calculating time (Surah 10, verse 5, quoted at the beginning of this chapter.) This system has often been criticized for being archaic, impractical and unscientific in comparison to our system based on the Earth's rotation around the Sun, expressed today in the Julian calendar. This criticism calls for the following two remarks:

Nearly fourteen centuries ago, the Qur'an was directed at the inhabitants of the Arabian Peninsula who

were used to the lunar calculation of time. It was advisable to address them in the only language they could understand and not to upset the habits they had of locating spatial and temporal reference-marks which were nevertheless quite efficient. It is known how well-versed men living in the desert are in the observation of the sky. They navigated according to the stars and told the time according to the phases of the Moon. Those were the simplest and most reliable means available to them.

Apart from the specialists in this field, most people are unaware of the perfect correlation between the Julian and the lunar calendar: 235 lunar months correspond exactly to 19 Julian years of 365 1/4 days. Then length of our year of 365 days is not perfect because it has to be rectified every four years (with a leap year). With the lunar calendar, the same phenomena occur every 19 years (Julian). This is the Metonic cycle, named after the Greek astronomer Meton, who discovered this exact correlation between solar and lunar time in the Fifth century B.C.

The Sun

It is more difficult to conceive of the Sun's orbit because we are so used to seeing our solar system organized around it. To understand the verse from the Qur'an, the position of the Sun in our galaxy must be considered, and we must therefore call on modern scientific ideas.

Our galaxy includes a very large number of stars spaced so as to form a disc that is denser at the centre than at the rim. The Sun occupies a position in it which is far removed from the centre of the disc. The galaxy revolves on its own axis which is its centre with the result that the Sun revolves around the same centre in a circular orbit.

Modern astronomy has worked out the details of this. In 1917, Shapely estimated the distance between the Sun and the centre of our galaxy at 10 kilo parsecs i.e., in miles, circa the figure 2 followed by 17 zeros. To complete one revolution on its own axis, the galaxy and Sun take roughly 250 million years. The Sun travels at roughly 150 miles per second in the completion of this.

The above is the orbital movement of the Sun that was already referred to by the Qur'an fourteen centuries ago. The demonstration of the existence and details of this is one of the achievements of modern astronomy.

Reference to the Movement of the Moon and the Sun in Space With Their Own Motion

This concept does not appear in those translations of the Qur'an that have been made by men of letters. Since the latter know nothing about astronomy, they have translated the Arabic word that expresses this movement by one of the meanings the word has: 'to swim'. They have done this in both the French translations and the, otherwise remarkable, English translation by Yusuf Ali.[21](#)

The Arabic word referring to a movement with a self-propelled motion is the verb *Sabaha* (*Yasbahuna* in the text of the two verses). All the senses of the verb imply a movement that is associated with a motion

that comes from the body in question. If the movement takes place in water, it is 'to swim'; it is 'to move by the action of one's own legs' if it takes place on land. For a movement that occurs in space, it is difficult to see how else this meaning implied in the word could be rendered other than by employing its original sense. Thus there seems to have been no mistranslation, for the following reasons.

- The Moon completes its rotating motion on its own axis at the same time as it revolves around the Earth, i.e. 29 1/2 days (approx.), so that it always has the same side facing us.
- The Sun takes roughly 25 days to revolve on its own axis. There are certain differences in its rotation at its equator and poles, (we shall not go into them here) but as a whole, the Sun is animated by a rotating motion. It appears therefore that a verbal nuance in the Qur'an refers to the Sun and Moon's own motion. These motions of the two celestial bodies are confirmed by the data of modern science, and it is inconceivable that a man living in the Seventh century A.D., however knowledgeable he might have been in his day (and this was certainly not true in Muhammad's case), could have imagined them.

This view is sometimes contested by examples from great thinkers of antiquity who indisputably predicted certain data that modern science has verified. They could hardly have relied on scientific deduction however; their method of procedure was more one of philosophical reasoning. Thus, the case of the Pythagoreans is often advanced. In the Sixth century B.C., they defended the theory of the rotation of the Earth on its own axis and the movement of the planets around the Sun. This theory was to be confirmed by modern science.

By comparing it with the case of the Pythagoreans, it is easy to put forward the hypothesis of Muhammad as being a brilliant thinker, who was supposed to have imagined all on his own what modern science was to discover centuries later. In so doing however, people quite simply forget to mention the other aspect of what these geniuses of philosophical reasoning produced, i.e. the colossal blunders that litter their work.

It must be remembered for example, that the Pythagoreans also defended the theory whereby the Sun was fixed in space; they made it the centre of the world and only conceived of a celestial order that was centred on it. It is quite common in the works of the great philosophers of antiquity to find a mixture of valid and invalid ideas about the Universe. The brilliance of these human works comes from the advanced ideas they contain, but they should not make us overlook the mistaken concepts which have also been left to us.

From a strictly scientific point of view, this is what distinguished them from the Qur'an. In the latter, many subjects are referred to that have a bearing on modern knowledge without one of them containing a statement that contradicts what has been established by present-day science.

[The Sequence of Day and Night](#)

At a time when it was held that the Earth was the centre of the world and that the Sun moved in relation

to it, how could anyone have failed to refer to the Sun's movement when talking of the sequence of night and day? This is not however referred to in the Qur'an and the subject is dealt with as follows:

“(God) covers the day with the night which is in haste to follow it...” (7:54)

“And a sign for them (human beings) is the night. We strip it of the day and they are in darkness.” (36:37)

“Hast thou not seen how God merges the night into the day and merges the day into the night.” (31:29)

“...He coils the night upon the day and He coils the day upon the night.” (39:5)

The first verse cited requires no comment. The second simply provides an image. It is mainly the third and fourth verses quoted above that provide interesting material on the process of interpenetration and especially of winding the night upon the day and the day upon the night. (Surah 39, verse 5)

'To coil' or 'to wind' seems, as in the French translation by R. Blachère, to be the best way of translating the Arabic verb *Kawwara*. The original meaning of the verb is to 'coil' a turban around the head; the notion of coiling is preserved in all the other senses of the word.

What actually happens however in space? American astronauts have seen and photographed what happens from their spaceships, especially at a great distance from Earth e.g. from the Moon. They saw how the Sun permanently lights up (except in the case of an eclipse) the half of the Earth's surface that is facing it, while the other half of the globe is in darkness. The Earth turns on its own axis and the lighting remains the same, so that an area in the form of a half-sphere makes one revolution around the Earth in twenty-four hours while the other half-sphere that has remained in darkness, makes the same revolution in the same time.

This perpetual rotation of night and day is quite clearly described in the Qur'an. It is easy for the human understanding to grasp this notion nowadays because we have the idea of the Sun's (relative) immobility and the Earth's rotation. This process of perpetual coiling, including the interpenetration of one sector by another is expressed in the Qur'an just as if the concept of the Earth's roundness had already been conceived at the time which was obviously not the case.

Further to the above reflections on the sequence of day and night, one must also mention, with a quotation of some verses from the Qur'an, the idea that there is more than one Orient and one Occident. This is of purely descriptive interest because these phenomena rely on the most commonplace observations. The idea is mentioned here with the aim of reproducing as faithfully as possible all that the Qur'an has to say on this subject.

The following are examples:

- In Surah 70, the expression:

“Lord of Orient and Occidents” (70:40).

- In Surah 55, verse 17, the expression:

“Lord of the two Orient and the two Occidents” (55: 17).

- In Surah 43, verse 38, a reference to the;

“distance between the two Orient” (43:38)

An image intended to express the immense size of the distance separating the two points.

Anyone who carefully watches the sunrise and sunset knows that the Sun rises at different point of the Orient and sets at different points of the Occident, according to season. Bearings taken on each of the horizons define the extreme limits that mark the two Orient and Occident, and between these there are points marked off throughout the year. The phenomenon described here is rather commonplace, but what mainly deserves attention in this chapter are the other topics dealt with, where the description of astronomical phenomena referred to in the Qur'an is in keeping with modern data.

D) Evolution Of The Heavens

Having called modern concepts on the formation of the Universe to mind, reference was made to the evolution that took place, starting with primary nebula through to the formation of galaxies, stars and (for the solar system) the appearance of planets beginning with the Sun at a certain stage of its evolution. Modern data lead us to believe that in the solar system, and more generally in the Universe itself, this evolution is still continuing.

How can anybody who is aware of these ideas fail to make a comparison with certain statements found in the Qur'an in which the manifestations of divine Omnipotence are referred to. The Qur'an reminds us several times that:

“(God) subjected the sun and the moon: each one runs its course to an appointed term.” (13:2, 31:29, 35: 13, 39:5)

This sentence is to be found in Surah 13, verse 2. Surah 31, verse 29; Surah 35, verse 13 and Surah 39, verse 5. In addition to this, the idea of a settled place is associated with the concept of a destination place in Surah 36, verse 38:

“The Sun runs its course to a settled place. This is the decree of the All Mighty, the Full of Knowledge.” (36:38)

'Settled place' is the translation of the word *Mustaqarr* and there can be no doubt that the idea of an

exact place is attached to it. How do these statements fare when compared with data established by modern science? The Qur'an gives an end to the Sun for its evolution and a destination place. It also provides the Moon with a settled place. To understand the possible meanings of these statements, we must remember what modern knowledge has to say about the evolution of the stars in general and the Sun in particular, and (by extension) the celestial bodies that automatically followed its movement through space, among them the Moon.

The Sun is a star that is roughly 4½ billion years old, according to experts in astrophysics. It is possible to distinguish a stage in its evolution, as one can for all the stars. At present, the Sun is at an early stage, characterized by the transformation of hydrogen atoms into helium atoms.

Theoretically, this present stage should last another 5½ billion years according to calculations that allow a total of 10 billion years for the duration of the primary stage in a star of this kind. It has already been shown, in the case of these other stars that this stage gives way to a second period characterized by the completion of the transformation of hydrogen into helium, with the resulting expansion of its external layers and the cooling of the Sun.

In the final stage, its light is greatly diminished and density considerably increased; this is to be observed in the type of star known as a 'white dwarf'. The above dates are only of interest in as far as they give a rough estimate of the time factor involved, what is worth remembering and is really the main point of the above, is the notion of an evolution. Modern data allow us to predict that, in a few billion years, the conditions prevailing in the solar system will not be the same as they are today.

Like other stars whose transformations have been recorded until they reached their final stage, it is possible to predict an end to the Sun. The second verse quoted above (Surah 36, verse 38) referred to the Sun running its course towards a place of its own.

Modern astronomy has been able to locate it exactly and has even given it a name, the Solar Apex: the solar system is indeed evolving in space towards a point situated in the Constellation of Hercules (Alpha Lyrae) whose exact location is firmly established; it is moving at a speed already ascertained at something in the region of 12 miles per second.

All these astronomical data deserve to be mentioned in relation to the two verses from the Qur'an, since it is possible to state that they appear to agree perfectly with modern scientific data.

[The Expansion Of The Universe](#)

The expansion of the Universe is the most imposing discovery of modern science. Today it is a firmly established concept and the only debate centres around the way this is taking place. It was first suggested by the general theory of relativity and is backed up by physics in the examination of the galactic spectrum; the regular movement towards the red section of their spectrum may be explained by the distancing of one galaxy from another.

Thus the size of the Universe is probably constantly increasing and this increase will become bigger the further away the galaxies are from us. The speeds at which these celestial bodies are moving may, in the course of this perpetual expansion, go from fractions of the speed of light to speeds faster than this.

The following verse of the Qur'an (Surah 51, verse 47) where God is speaking, may perhaps be compared with modern ideas:

“The heaven, We have built it with power. Verily, We are expanding it.” (51:47)

'Heaven' is the translation of the word *Sama'* and this is exactly the extra-terrestrial world that is meant. 'We are expanding it' is the translation of the plural present participle *Musi'una* of the verb *Aausa'a* meaning 'to make wider, more spacious, to extend, to expand'.

Some translators who were unable to grasp the meaning of the latter provide translations that appear to me to be mistaken, e.g. “we give generously” (R. Blachère). Others sense the meaning, but are afraid to commit themselves: Hamidullah in his translation of the Qur'an talks of the widening of the heavens and space, but he includes a question mark.

Finally, there are those who arm themselves with authorized scientific opinion in their commentaries and give the meaning stated here. This is true in the case of the *Muntakab*, a book of commentaries edited by the Supreme Council for Islamic Affairs, Cairo. It refers to the expansion of the Universe in totally unambiguous terms.

E) The Conquest Of Space

From this point of view, three verses of the Qur'an should command our full attention. One expresses, without any trace of ambiguity, what man should and will achieve in this field. In the other two, God refers for the sake of the unbelievers in Makkah to the surprise they would have if they were able to raise themselves up to the Heavens; He alludes to a hypothesis which will not be realized for the latter. The first of these verses is:

“O assembly of Jinns and Men, if you can penetrate regions of the heavens and the earth, then penetrate them! You will not penetrate them save with a Power.”[22\(55:33\)](#)

The translation given here needs some explanatory comment: The word 'if' expresses in English a condition that is dependent upon a possibility and either an achievable or an unachievable hypothesis. Arabic is a language which is able to introduce a nuance into the condition which is much more explicit. There is one word to express the possibility (*Ida*), another for the achievable hypothesis (*In*) and a third for the unachievable hypothesis expressed by the word (*Lau*).

The verse in question has it as an achievable hypothesis expressed by the word (*In*). The Qur'an therefore suggests the material possibility of a concrete realization. This subtle linguistic distinction

formally rules out the purely mystic interpretation that some people have (quite wrongly) put on this verse.

God is addressing the spirits (*Jinn*) and human beings (*Ins*), and not essentially allegorical figures. 'To penetrate' is the translation of the verb *Nafada* followed by the preposition *Min*. According to Kazimirski's dictionary, the phrase means 'to pass right through and come out on the other side of a body' (e.g. an arrow that comes out on the other side). It therefore suggests a deep penetration and emergence at the other end into the regions in question.

The Power (Sultan) these men will have to achieve this enterprise would seem to come from the All-Mighty. There can be no doubt that this verse indicates the possibility men will one day achieve what we today call (perhaps rather improperly) 'the conquest of space'. One must note that the text of the Qur'an predicts not only penetration through the regions of the Heavens, but also the Earth, i.e. the exploration of its depths.

The other two verses are taken from Surah 15, (verses 14 and 15). God is speaking of the unbelievers in Makkah, as the context of this passage in the Surah shows:

“Even if We opened unto them a gate to Heaven and they were to continue ascending therein, they would say, our sight is confused as in drunkenness. Nay, we are people bewitched.”
(15: 14–15)

The above expresses astonishment at a remarkable spectacle, different from anything man could imagine. The conditional sentence is introduced here by the word *Lau* which expresses a hypothesis that could never be realized as far as it concerned the people mentioned in these verses.

When talking of the conquest of space therefore, we have two passages in the text of the Qur'an: one of them refers to what will one day become a reality thanks to the powers of intelligence and ingenuity God will give to man, and the other describes an event that the unbelievers in Makkah will never witness, hence its character of a condition never to be realized.

The event will however be seen by others, as intimated in the first verse quoted above. It describes the human reactions to the unexpected spectacle that travellers in space will see, their confused sight, as in drunkenness, the feeling of being bewitched...

This is exactly how astronauts have experienced this remarkable adventure since the first human spaceflight around the world in 1961. It is known in actual fact how once one is above the Earth's atmosphere, the Heavens no longer have the azure appearance we see from Earth, which results from phenomena of absorption of the Sun's light into the layers of the atmosphere. The human observer in space above the Earth's atmosphere sees a black sky and the Earth seems to be surrounded by a halo of bluish colour due to the same phenomena of absorption of light by the Earth's atmosphere.

The Moon has no atmosphere, however, and therefore appears in its true colours against the black background of the sky. It is a completely new spectacle therefore that presents itself to men in space, and the photographs of this spectacle are well known to present-day man.

Here again, it is difficult not to be impressed, when comparing the text of the Qur'an to the data of modern science, by statements that simply cannot be ascribed to the thought of a man who lived more than fourteen centuries ago.

5) The Earth

As in the case of the subjects already examined, the verses of the Qur'an dealing with the Earth are dispersed throughout the Book. It is difficult to classify them, and the scheme adopted here is a personal one. To explain them more clearly, one might begin by singling out a certain number of verses that deal with more than one subject at a time. These verses are largely general in their application and constitute an invitation extended to men to reflect on divine Beneficence by pondering on the examples provided. Other groups of verses may be singled out which deal with more specific subjects, as follows:

- The water cycle and the seas.
- The Earth's relief.
- The Earth's atmosphere.

A) Verses Containing General Statements

Although these verses provide arguments intended to lead man to meditate on the Beneficence of God towards His creatures, here and there they contain statements that are interesting from the point of view of modern science. They are perhaps especially revealing by virtue of the fact that they do not express the varied beliefs concerning natural phenomena that were current at the time of the Qur'anic Revelation. These beliefs were later to be shown by scientific knowledge to be mistaken.

On the one hand, these verses express simple ideas readily understood by to those people to whom, for geographical reasons, the Qur'an was first directed: the inhabitants of Makkah and Madinah, the Bedouins of the Arabian Peninsula. On the other hand, they contain reflections of a general nature from which a more cultivated public of any time and place may learn something instructive, once it starts to think about them: this is a mark of the Qur'an's universality.

As there is apparently no classification of such verses in the Qur'an, they are presented here in the numerical order of the Surahs:

“(God) is the One who made the earth a couch for you and the heavens an edifice, and sent down water from the sky. He brought forth therewith fruits for your sustenance. Do not join equals with

God when you know.” (2:22)

“Behold! In the creation of the heavens and the earth, In the disparity of night and day, In the ship which runs upon the sea for the profit of mankind, In the water which God sent down from the sky thereby reviving the earth after its death, In the beasts of all kinds He scatters therein, In the change of the winds and the subjected clouds between the sky and earth, Here are Signs for people who are wise.” (2: 164)

“(God) is the One who spread out the earth and set therein mountains standing firm and rivers. For every fruit He placed two of a pair. He covers the day with the night. Verily in this there are Signs for people who reflect.” (13:3)

God is speaking:

“The earth, We spread it out and set thereon mountains standing firm. We caused all kind of things to grow therein in due balance. Therein We have provided you and those you do not supply with means of subsistence and there is not a thing but its stores are with Us. We do not send it down save in appointed measure.” (15: 19–21)

“(God is) the One Who has made for you the earth like a cradle and inserted roads into it for you. He sent water down from the sky and thereby We brought forth pairs of plants, each separate from the other. Eat! Pasture your cattle! Verily in this are Signs for people endued with intelligence.” (20:53–54)

“He Who made the earth an abode and set rivers in its interstices and mountains standing firm. He placed a barrier between the two seas. Is there any divinity besides God? Nay, but most people do not know.” (27:61)

Here a reference is made to the general stability of the Earth's crust. It is known that at the early stages of the Earth's existence before its crust cooled down, the latter was unstable. The stability of the Earth's crust is not however strictly uniform, since there are zones where earthquakes intermittently occur. As to the barrier between the two seas, it is an image which signifies that the waters of the great rivers and the waters of the sea do not mix at the level of certain large estuaries.

“(God is) the One Who made the earth docile to you. So walk upon its shoulders! Eat of His sustenance! Unto Him will be the Resurrection.” (67: 15)

“After that (God) spread the earth out. There from He drew out its water and its pasture. And the mountains He has firmly fixed. Goods for you and for your cattle.” (79:30–33)

In many such verses, emphasis is laid upon the importance of water and the practical consequences of its presence in the earth's soil, i.e. the fertility of the soil. There can be no doubt that in desert countries, water is the most important element governing man's survival. The reference in the Qur'an however goes

beyond this geographical detail.

According to scientific knowledge the character the Earth has of a planet that is rich in water is unique to the solar system, and this is exactly what is highlighted in the Qur'an. Without water, the Earth would be a dead planet like the Moon. The Qur'an gives first place to water among the natural phenomena of the Earth that it refers to. The water cycle is described with remarkable accuracy in the Qur'an.

B) The Water Cycle And The Seas

When the verses of the Qur'an concerning the role of water in man's existence are read in succession today, they all appear to us to express ideas that are quite obvious. The reason for this is simple: in our day and age, we all, to a lesser or greater extent, know about the water cycle in nature.

If however, we consider the various concepts the ancients had on this subject, it becomes clear that the data in the Qur'an do not embody the mythical concepts current at the time of the Revelation which had been developed more according to philosophical speculation than observed phenomena. Although it was empirically possible to acquire on a modest scale, the useful practical knowledge necessary for the improvement of the irrigation, the concepts held on the water cycle in general would hardly be acceptable today.

Thus it would have been easy to imagine that underground water could have come from the infiltration of precipitations in the soil. In ancient times however, this idea, held by Vitruvius Polio Marcus in Rome, 1st century B.C., was cited as an exception. For many centuries therefore (and the Qur'anic Revelation is situated during this period) man held totally inaccurate views on the water cycle.

Two specialists on this subject, G. Gastany and B. Blavoux, in their entry in the Universalis Encyclopedia (Encyclopedia Universalis) under the heading Hydrogeology (Hydrogéologie), give an edifying history of this problem.

"In the Seventh century B.C., Thales of Miletus held the theory whereby the waters of the oceans, under the effect of winds, were thrust towards the interior of the continents; so the water fell upon the earth and penetrated into the soil. Plato shared these views and thought that the return of the waters to the oceans was via a great abyss, the 'Tartarus'. This theory had many supporters until the Eighteenth century, one of whom was Descartes.

Aristotle imagined that the water vapour from the soil condensed in cool mountain caverns and formed underground lakes that fed springs. He was followed by Seneca (1st Century A.D.) and many others, until 1877, among them O. Volger... The first clear formulation of the water cycle must be attributed to Bernard Palissy in 1580, he claimed that underground water came from rainwater infiltrating into the soil. This theory was confirmed by E. Mariotte and P. Perrault in the Seventeenth century. In the following passages from the Qur'an, there is no trace of the mistaken ideas that were current at the time of Muhammad:

“We²³ sent down from the sky blessed water whereby We caused to grow gardens, grains for harvest, tall palm-trees with their spathes, piled one above the other sustenance for (Our) servants. Therewith We gave (new) life to a dead land. So will be the emergence (from the tombs).” (50:9–11)

“We sent down water from the sky in measure and lodged it in the ground. And We certainly are able to withdraw it. Therewith for you We gave rise to gardens of palm trees and vineyards where for you are abundant fruits and of them you eat.” (23: 18–19)

“We sent forth the winds that fecundate. We cause the water to descend from the sky. We provide you with the water, you (could) not be the guardians of its reserves.” (15:22)

There are two possible interpretations of this last verse. The fecundating winds may be taken to be the fertilizers of plants because they carry pollen. This may, however, be a figurative expression referring by analogy to the role the wind plays in the process whereby a non-rain carrying cloud is turned into one that produces a shower of rain. This role is often referred to, as in the following verses:

“God is the One Who sends forth the winds which raised up the clouds. We drive them to a dead land. Therewith We revive the ground after its death. So will be the Resurrection.” (35:9)

It should be noted how the style is descriptive in the first part of the verse, then passes without transition to a declaration from God. Such sudden changes in the form of the narration are very frequent in the Qur'an.

“God is the One Who sends forth the winds which raised up the clouds. He spreads them in the sky as He wills and breaks them into fragments. Then thou seest raindrops issuing from within them. He makes them reach such of His servants as He wills. And they are rejoicing.” (30:48)

“(God) is the One Who sends forth the winds like heralds of His Mercy. When they have carried the heavy-laden clouds, We drive them to a dead land. Then We cause water to descend and thereby bring forth fruits of every kind. Thus We will bring forth the dead. Maybe you will remember.” (7:57)

“(God) is the One Who sends forth the winds like heralds of His Mercy. We cause pure water to descend in order to revive a dead land with it and to supply with drink the multitude of cattle and human beings We have created.” (25:48–49)

“...In the provision that God sends down from the sky and thereby He revives the ground after its death and in the change (of direction) of winds, there are Signs for people who are wise.” (45:5)

The provision made in this last verse is in the form of the water sent down from the sky, as the context shows. The accent is on the change of the winds that modify the rain cycle.

“(God) sends water down from the sky so that the rivers flow according to their measure. The torrent bears away an increasing foam.” (13:17)

God commands the Prophet:

“Say. Do you see if your water were to be lost in the ground, who then can supply you with gushing water?” (67:30)

“Hast thou not seen that God sent water down from the sky and led it through sources into the ground? Then He caused sown fields of different colours to grow.” (39:21)

“Therein We placed gardens of palm-trees and vineyards and We caused water springs to gush forth.” (36:34)

The importance of springs and the way they are fed by rainwater conducted into them is stressed in the last three verses. It is worth pausing to examine this fact and call to mind the predominance in the Middle Ages of views such as those held by Aristotle, according to whom springs were fed by underground lakes.

In his entry on Hydrology (Hydrologie) in the Universalis Encyclopedia (Encyclopedie Universalis) M.R. Remenieras, a teacher at the French National School of Agronomy (Ecole nationale du Genie rural, des Eaux et Forêts), describes the main stages of hydrology and refers to the magnificent irrigation works of the ancients, particularly in the Middle East. He notes however that an empirical outlook ruled over everything, since the ideas of the time proceeded from mistaken concepts.

He continues as follows: “It was not until the Renaissance (between circa 1400 and 1600) that purely philosophical concepts gave way to research based on the objective observation of hydrologic phenomena. Leonardo da Vinci (1452–1519) rebelled against Aristotle's statements. Bernard Palissy, in his Wonderful discourse on the nature of waters and fountains both natural and artificial (Discours admirable de la nature des eaux et fontaines tant naturelles qu'artificielles (Paris, 1570)) gives a correct interpretation of the water cycle and especially of the way springs are fed by rainwater.”

This last statement is surely exactly what is mentioned in verse 21, Surah 39 describing the way rainwater is conducted into sources in the ground. The subject of verse 43, Surah 24 is rain and hail:

“Hast thou not seen that God makes the clouds move gently, then joins them together, then makes them a heap. And thou seest raindrops issuing from within it. He sends down from the sky mountains of hail, He strikes therewith whom He wills and He turns it away from whom He wills. The flashing of its lightning almost snatches away the sight.” (24:43)

The following passage requires some comment:

“Have you observed the water you drink? Do you bring it down from the rain clouds? Or do We?

If it were Our will, We could make it salty. Then why are you not thankful?" (56:68-70)

This reference to the fact that God could have made fresh water salty is a way of expressing divine Omnipotence. Another means of reminding us of the same Omnipotence is the challenge to man to make rain fall from the clouds. In modern times however, technology has surely made it possible to create rain artificially. Can one therefore oppose the statement in the Qur'an to man's ability to produce precipitations?

The answer is no, because it seems clear that one must take account of man's limitations in this field. M.A. Facy, an expert at the French Meteorological Office, wrote the following in the Universalis Encyclopedia (Encyclopedia Universalis) under the heading Precipitations (Precipitations): "It will never be possible to make rain fall from a cloud that does not have the suitable characteristics of a rain cloud or one that has not yet reached the appropriate stage of evolution (maturity)".

Man can never therefore hasten the precipitation process by technical means when the natural conditions for it are not present. If this were not the case, droughts would never occur in practice, which they obviously do. To have control over rain and fine weather still remains a dream therefore. Man cannot wilfully break the established cycle that maintains the circulation of water in nature. This cycle may be outlined as follows, according to modern ideas on hydrology.

The calories obtained from the Sun's rays cause the sea and those parts of the Earth's surface that are covered or soaked in water to evaporate. The water vapour that is given off rises into the atmosphere and, by condensation, forms into clouds. The winds then intervene and move the clouds thus formed over varying distances. The clouds can then either disperse without producing rain, or combine their mass with others to create even greater condensation, or they can fragment and produce rain at some stages in their evolution.

When rain reaches the sea (70% of the Earth's surface is covered by seas), the cycle is soon repeated. When rain falls on the land, it may be absorbed by vegetation and thus aid the latter's growth; the vegetation in its turn gives off water and thus returns some water to the atmosphere. The rest, to a lesser or greater extent, infiltrates into the soil, whence it is either conducted through channels into the sea, or comes back to the Earth's surface, network through springs or resurgences.

When one compares the modern data of hydrology to what is contained in the numerous verses of the Qur'an quoted in this paragraph, one has to admit that there is a remarkable degree of agreement between them.

[The Seas](#)

Whereas the above verses from the Qur'an have provided material for comparison between modern knowledge about the water cycle in nature, this is not the case for the seas. There is not a single statement in the Qur'an dealing with the seas which could be used for comparison with scientific data per

se. This does not diminish the necessity of pointing out however that none of the statements in the Qur'an on the seas refers to the beliefs, myths or superstitions prevalent at the time of its Revelation.

A certain number of verses deal with the seas and navigation. As subjects for reflection, they provide indications of divine Omnipotence that arise from the facts of common observation. The following verses are examples of this:

“(God) has made the ship subject to you, so that it runs upon the sea at His Command.” (14:32)

“(God) is the One Who subjected the sea, so that you eat fresh meat from it and you extract from it ornaments which you wear. Thou seest the ships plowing the waves, so that you seek of His Bounty. Maybe, you will be thankful.” (16:14)

“Hast thou seen that the ship runs upon the sea by the Grace of God, in order to show you His signs. Verily in this are Signs for all who are persevering and grateful.” (31:31)

“His are the ships erected upon the sea like tokens.” (55:24)

“A sign for them is that We bore their offspring in the loaded Ark. We have created for them similar (vessels) on which they ride. If We will, We drown them and there is no help and they will not be saved unless by Mercy from Us and as a gratification for a time.” (36:41-44)

The reference here is quite clearly to the vessel bearing man upon the sea, just as, long ago, Noah and the other occupants of the vessel were carried in the Ark that enabled them to reach dry land. Another observed fact concerning the sea stands out, because of its unusual nature, from the verses of the Qur'an devoted to it: three verses refer to certain characteristics shared by great rivers when they flow out into the ocean.

The phenomenon is well-known and often seen whereby the immediate mixing of salty seawater and fresh river water does not occur. The Qur'an refers to this in the case of what is thought to be the estuary of the Tigris and Euphrates where they unite to form what one might call a 'sea' over 100 miles long, the Shatt Al Arab. At the inner parts of the gulf, the effect of the tides is to produce the welcome phenomenon of the reflux of fresh water to the interior of the dry land, thus ensuring adequate irrigation.

To understand the text correctly, one has to know that the English word 'sea' conveys the general meaning of the Arabic word Bahr which designates a large mass of water and is equally used for both the sea and the great rivers: the Nile, Tigris and Euphrates for example.

The following are the three verses that describe this phenomenon:

“(God) is the One Who has let free the two seas, one is agreeable and sweet, the other salty and bitter. He placed a barrier between them, a partition that it is forbidden to pass.” (25:53)

“The two seas are not alike. The water of one is agreeable, sweet, pleasant to drink. The other salty and bitter. You eat fresh meat from it and you extract from it ornaments which you wear.” (35: 12)

“He has loosed the two seas. They meet together. Between them there is a barrier which they do not transgress. Out of them come pearls and coral.” (55: 19, 20, 22)

In addition to the description of the main fact, these verses refer to what may be obtained from fresh water and seawater: fish, personal adornment, i.e. coral and pearls. With regard to the phenomenon whereby the river water does not mix with seawater at the estuary, one must understand that this is not peculiar to the Tigris and Euphrates; they are not mentioned by name in the text, but it is thought to refer to them. Rivers with a very large outflow, such as the Mississippi and the Yangtze, have the same peculiarity, the mixing of their fresh water with the salty water of the sea does not often occur until very far out at sea.

C) The Earth's Relief

The constitution of the Earth is highly complex. Today, it is possible to imagine it very roughly as being formed of a deep layer, at very high temperature, and especially of a central area where rocks are still in fusion, and of a surface layer, the Earth's crust which is solid and cold. The crust is very thin; its thickness is estimated in units of miles or units of ten miles at the most. The Earth's radius is however slightly over 3,750 miles, so that its crust does not represent (on average) one hundredth of that of the sphere's radius.

It is upon this skin, as it were, that all geological phenomena have taken place. At the origin of these phenomena are folds that were to form the mountain ranges; their formation is called 'orogenesis' in geology, the process is of considerable importance because with the development of a relief that was to constitute a mountain, the Earth's crust was driven in proportionately far down: this process ensures a foundation in the layer that underlies it.

The history of the distribution of the sea and land on the surface of the globe has only recently been established and is still very incomplete, even for the most recent and best known periods. It is likely that the oceans appeared and formed the hydrosphere circa half a billion years ago. The continents were probably a single mass at the end of the primary era, then subsequently broke apart. Some continents or parts of continents have moreover emerged through the formation of mountains in maritime zones (e.g. the North Atlantic continent and part of Europe).

According to modern ideas, the dominating factor in the formation of the land that emerged was the development of mountain ranges. The evolution of the land, from the primary to the quaternary era, is classed according to 'orogenic phases' that are themselves grouped into 'cycles' of the same name since the formation of all mountains reliefs had repercussions on the balance between the sea and the

continents.

It made some parts of the land disappear and others emerge, and for hundreds of millions of years it has altered the surface distribution of the continents and oceans: the former at present only occupying three tenths of the surface of this planet. In this way it is possible to give a very rough outline of the transformations that have taken place over the last hundreds of millions of years.

When referring to the Earth's relief, the Qur'an only describes, as it were, the formation of the mountains. Seen from the present point of view, there is indeed little one can say about the verses that only express God's Beneficence to man with regard to the Earth's formation, as in the following verses:

“For you God made the earth a carpet so that you travel along its roads and the paths of valleys.”
(71: 19, 20)

“The earth, We have spread it out. How excellently We did that.” (51:48)

The carpet which has been spread out is the Earth's crust, a solidified shell on which we can live, since the globe's sub-strata are very hot, fluid and hostile to any form of life. The statements in the Qur'an referring to the mountains and the references to their stability subsequent to the phenomenon of the folds are very important. The context invites unbelievers to consider certain natural phenomena, among them:

“...the mountains, how they have been pitched (like a tent). The Earth how it was made even.”
(88: 19-20)

The following verses give details about the way in which the mountains were anchored in the ground:

“Have We not made the earth an expanse and the mountains stakes.” (78:6-7)

The stakes referred to, are the ones used to anchor a tent in the ground (*Autad*, plural of *Watad*). Modern geologists describe the folds in the Earth as giving foundations to the mountains, and their dimensions go roughly one mile to roughly 10 miles. The stability of the Earth's crust results from the phenomenon of these folds. So it is not surprising to find reflections on the mountains in certain passages of the Qur'an, such as the following:

“And the mountains (God) has fixed them firmly.” (79:32)

“(God) has cast into the ground (mountains) standing firm, so that it does not shake with you.”
(31: 10)

The same phrase is repeated in Surah 16, verse 15; and the same idea is expressed with hardly any change in Surah 21, verse 31:

“We have placed in the ground (mountains) standing firm so that it does not shake with them.”

(16: 15, 21:31)

These verses express the idea that the way the mountains are laid out ensures stability and is in complete agreement with geological data.

D) The Earth's Atmosphere

In addition to certain statements specifically relating to the sky, examined in the preceding chapter, the Qur'an contains several passages dealing with the phenomena that occur in the atmosphere. As for the comparison between them and the data of modern science, it is to be noted here, as elsewhere, that there is absolutely no contradiction between today's modern scientific knowledge and the phenomena described.

Altitude

A familiar feeling of discomfort experienced at high altitude, which increases the higher one climbs, is expressed in verse 125, Surah 6:

“Those whom God wills to guide, He opens their breast to Islam. Those whom He wills lose their way, He makes their breast narrow and constricted, as if they were climbing in the sky.” (16: 125)

Some commentators have claimed that the notion of discomfort at high altitude was unknown to the Arabs of Muhammad's time. It appears that this was not true at all: the existence on the Arabian Peninsula of peaks rising over two miles high makes it extremely implausible that they should not have known of the difficulty of breathing at high altitude.²⁴ Others have seen in this verse a prediction of the conquest of space, an opinion that appears to require categorical denial, at least for this passage.

Electricity in the Atmosphere

Electricity in the atmosphere and the consequences of this, i.e. lightning and hail, are referred to in the following verses:

“(God) is the One Who shows you the lightning, with fear and covetousness. He raised up the heavy clouds. The thunder glorifies His Praise and so do the angels for awe. He sends the thunder-bolt and strikes with them who He wills while they are disputing about God. He is All Mighty in His Power.” (13: 12–13)

Surah 24, verse 43 (already quoted in this chapter):

“Hast thou not seen that God makes the clouds move gently, then joins them together, then makes them a heap. And thou seest raindrops issuing from within it. He sends down from the sky mountains of hail, He strikes therewith whom He wills and He turns it away from whom He wills. The flashing of its lightning almost snatches away the sight.” (24:43)

In these two verses there is the expression of an obvious correlation between the formation of heavy rain clouds or clouds containing hail and the occurrence of lightning, the former, the subject of covetousness on account of the benefit it represents and the latter, the subject of fear, because when it falls, it is at the will of the All-Mighty. The connection between the two phenomena is verified by present day knowledge of electricity in the atmosphere.

Shadows

The phenomenon of shadows and the fact that they move is very simply explained today. It forms the subject of the following observations:

“Out of the things He created, God has given you shade...” (16:81)

“Have (the Unbelievers) not observed that for all the things God created, how their shadow shifts right and left, prostrating themselves to God while they are full of humility.” (16:48)

“Hast thou not seen how thy Lord has spread the shade. If He willed, He could have made it stationary. Moreover We made the sun its guide and We withdraw it towards Us easily.”(25:45–46)

Apart from the phrases dealing with the humility before God of all the things He created, including their shadow, and the fact that God can take back all manifestations of His Power, as He wills, the text of the Qur'an refers to the relationship between the Sun and the shadows. One must bear in mind at this point the fact that, in Muhammad's day, it was believed that the way a shadow moved was governed by the movement of the sun from east to west. This principle was applied in the case of the sundial to measure the time between sunrise and sunset.

In this instance, the Qur'an speaks of the phenomenon without referring to the explanation current at the time of the Revelation. It would have been readily accepted for many centuries by those who came after Muhammad. In the end however, it would have been shown to be inaccurate. The Qur'an only talks moreover of the function the sun has as an indicator of shadow. Evidently there is no contradiction between the way the Qur'an describes shadow and what we know of this phenomenon in modern times.

6) The Animal and Vegetable Kingdoms

Numerous verses describing the origins of life have been assembled in this chapter, along with certain aspects of the vegetable kingdom and general or specific topics relating to the animal kingdom. The grouping of verses scattered throughout the Book affords a general view of the data the Qur'an contains on these subjects. In the case of the subject of this and the following chapter, the examination of the Qur'anic text has sometimes been particularly delicate on account of certain difficulties inherent in the vocabulary.

These have only been overcome through the fact that scientific data which have a bearing on the subject

have been taken into consideration. It is particularly so in the case of living beings, i.e. animal, vegetable and human, where a confrontation with the teachings of science is shown to be indispensable in the search for the meaning of certain statements on these topics contained in the Qur'an.

It will become clear that numerous translations of these passages in the Qur'an, made by men of letters, must be deemed inaccurate by the scientist. The same holds true for commentaries made by those who do not possess the scientific knowledge necessary for an understanding of the text.

A) The Origins Of Life

This question has always preoccupied man, both for himself and for the living things around him. It will be examined here from a general point of view. The case of man, whose appearance on Earth and reproduction processes are the subject of lengthy exposés, will be dealt with in the next chapter. When the Qur'an describes the origins of life on a very broad basis, it is extremely concise. It does so in a verse that also mentions the process of the formation of the Universe, already quoted and commented on:

“Do not the Unbelievers see that the heavens and the earth were joined together, then We clove them asunder and We got every living thing out of the water. Will they then not believe?” (21:30)

The notion of 'getting something out of something' does not give rise to any doubts. The phrase can equally mean that every living thing was made of water (as its essential component) or that every living thing originated in water. The two possible meanings are strictly in accordance with scientific data.

Life is in fact of aquatic origin and water is the major component of all living cells. Without water, life is not possible. When the possibility of life on another planet is discussed, the first question is always: does it contain a sufficient quantity of water to support life?

Modern data lead us to think that the oldest living being must have belonged to the vegetable kingdom: algae have been found that date from the pre-Cambrian period, i.e. the time of the oldest known lands. Organisms belonging to the animal kingdom probably appeared slightly later, they too came from the sea.

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

“(God is the One Who) sent water down from the sky and thereby We brought forth pairs of plants each separate from the other.” (20:53)

This is the first reference to the notion of a pair in the vegetable kingdom. We shall return to this later. In the second meaning, a liquid without any further indication of what kind, the word is used in its indeterminate form to designate what is at the basis of the formation of all animal life:

“God created every animal from water.” (24:45)

We shall see further on how this word may also be applied to seminal fluid²⁵. Whether it deals therefore with the origins of life in general, or the element that gives birth to plants in the soil, or the seed of animals, all the statements contained in the Qur'an on the origin of life are strictly in accordance with modern scientific data. None of the myths on the origins of life that abounded at the time the Qur'an appeared are mentioned in the text.

B) The Vegetable Kingdom

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

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

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

“We sent down from the sky blessed water whereby We caused to grow gardens, grains for harvest, tall palm-trees with their spathes, piled one above the other sustenance for (Our) servants. Therewith We give (new) life to a dead land. So will be the emergence (from the tombs).” The Qur'an adds to these general data others that refer to more specialized subjects: (50:9–11)

Balance in the Vegetable Kingdom

“The earth... We caused all kinds of things to grow therein in due balance.” (15: 19)

The Different Qualities of Various Foods

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

It is interesting to note the existence of these verses because they show the sober quality of the terms used, and the absence of any description that might highlight the beliefs of the times, rather than fundamental truths. What particularly attracts our attention however, are the statements in the Qur'an

concerning reproduction in the vegetable kingdom.

Reproduction in the Vegetable Kingdom

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

Asexual reproduction is quite simply multiplication. It is the result of the fragmentation of an organism which has separated from the main plant and developed in such a way as to resemble the plant from which it came. It is considered by Guilliermond and Mange not to be a 'special case of growth'.

A very simple example of this is the cutting, a cutting taken from a plant is placed in suitably watered soil and regenerated by the growth of new roots. Some plants have organs specially designed for this, while others give off spores that behave like seeds, as it were, (it should be remembered that seeds are the results of a process of sexual reproduction).

Sexual reproduction in the vegetable kingdom is carried out by the coupling of the male and female parts of the generic formations united on a same plant or located on separate plants. This is the only form that is mentioned in the Qur'an.

“(God is the One Who) sent water down from the sky and thereby We brought forth pairs of plants each separate from the other.” (20:53)

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

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

“We caused to grow (on the earth) every noble pair (of plants).” (31:10)

“Of all fruits (God) placed (on the earth) two of a pair.” (13:3)

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

It must be noted that for certain species, fruit can come from non-fertilized flowers (parthenocarpic fruit),

e.g. bananas, certain types of pineapple, fig, orange, and vine. They can nevertheless also come from plants that have definite sexual characteristics.

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

“Verily, God splits the grain and the fruit-stone.” (6:95)

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

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

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

C) The Animal Kingdom

There are several questions in the Qur'an concerning the animal kingdom which are the subject of comments that call for a confrontation with modern scientific knowledge. Here again, however, one would gain an incomplete view of all that the Qur'an contains on this subject if one were to leave out a passage such as the extract which follows.

In this passage, the creation of certain elements in the animal kingdom is described with the purpose of making man reflect upon the divine Beneficence extended to him. It is quoted basically to provide an example of the way in which the Qur'an describes the harmonious adaptation of Creation to man's needs; it relates in particular the case of those people who live in a rural setting, since there is nothing that could be examined from a different point of view.

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

Alongside these general remarks, the Qur'an sets out certain data on highly diversified subjects:

- Reproduction in the animal kingdom.
- References to the existence of animal communities. Statements concerning bees, spiders and birds.
- Remarks on the source of constituents of animal milk.

Reproduction in the Animal Kingdom

This is very summarily dealt with in Surah 53:

“(God) fashioned the two of a pair, the male and the female, from a small quantity of liquid when it is poured out.” (53:45–46)

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

References to the Existence of Animal Communities

“There is no animal on earth, no bird which flies on wings, that (does not belong to) communities like you. We have not neglected anything in the Book (of Decrees). Then to their Lord they will be gathered.” (6:38)

There are several points in this verse which require comment. Firstly, it would seem that there is a description of what happens to animals after their death: Islam does not apparently, have any doctrine on this point. Then there is predestination in general²⁶ which would seem to be mentioned here. It could be conceived as absolute predestination or relative, i.e. limited to structures and a functional organization that condition modes of behaviour: the animal acts upon various exterior impulses in terms of a particular conditioning.

Blachère states that an older commentator, such as Razi, thought that this verse only referred to instinctive actions whereby animals worship God. Sheikh Si Boubakeur Hamza, in the commentary to his translation of the Qur'an, speaks of “the instinct which, according to Divine Wisdom, pushes all beings to group together, so that they demand that the work of each member serve the whole group.”

Animal behaviour has been closely investigated in recent decades, with the result that genuine animal communities have been shown to exist. Of course, for a long time now the results of a group or community's work have been examined and this has led to the acceptance of a community organization.

It has only been recently however, that the mechanisms which preside over this kind of organization have been discovered for certain species. The most studied and best known case is undoubtedly that of

bees, to whose behaviour the name von Frisch is linked. Von Frisch, Lorenz and Tinbergen received the 1973 Nobel Prize for their work in this field.

Statements Concerning Bees, Spiders and Birds

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

The fact that the text of the Qur'an refers to this exemplary trio in the animal kingdom is in absolute keeping with the exceptionally interesting character that each of these animals has from a scientific point of view.

Bees

In the Qur'an, bees are the subject of the longest commentary: Surah 16, verses 68 and 69:[27](#)

“Thy Lord inspired the bees: Choose your dwelling in the hills, in the trees and in what (man) built. Eat of all fruit and follow the ways of your Lord in humility. From within their bodies comes a liquor of different colours where is a remedy for men.” (16:68–69)

It is difficult to know what exactly is meant by the order to follow the ways of the Lord in humility, unless it is to be seen in general terms. All that may be said, with regard to the knowledge that has been gained of their behaviour, is that here, as in each of the three animal cases mentioned as examples in the Qur'an, there is a remarkable nervous organization supporting their behaviour.

It is known that the pattern of a bee's dance is a means of communication to other bees; in this way, bees are able to convey to their own species the direction and distance of flowers from which nectar is to be gathered. The famous experiment performed by von Frisch has shown the meaning of this insect's movement which is intended to transmit information between worker bees.

Spiders

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

“Those who choose masters other than God are like the spider when it takes for itself a dwelling. Verily, the flimsiest dwelling is the dwelling of the spider. If they but knew.” (29:41)

A spider's web is indeed constituted of silken threads secreted by the animal's glands and their calibre is infinitely fine. Its fragility cannot be imitated by man. Naturalists are intrigued by the extraordinary pattern

of work recorded by the animal's nervous cells, which allows it to produce a geometrically perfect web.

Birds

Birds are frequently mentioned in the Qur'an. They appear in episodes in the life of Abraham, Joseph, David, Solomon and Jesus. These references do not however have any bearing on the subject in hand. The verse concerning the existence of animal communities on the ground and bird communities in the sky has been noted above:

“There is no animal on the earth, no bird which flies on wings, that (does not belong to) communities like you. We have not neglected anything in the Book (of Decrees). Then to their Lord they will be gathered.” (6:38)

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

“Do they not look at the birds subjected in the atmosphere of the sky? None can hold them up (in His Power) except God.” (16:79)

“Have they not looked at the birds above them spreading their wings out and folding them? None can hold them up (in his Power) except the Beneficent.” (67: 19)

The translation of one single word in each of these verses is a very delicate matter. The translation given here expresses the idea that God holds the birds up in His Power. The Arabic verb in question is *Amsaka*, whose original meaning is 'to put one's hand on, seize, hold, hold someone back'.

An illuminating comparison can be made between these verses, which stress the extremely close dependence of the birds' behaviour on divine order, to modern data showing the degree of perfection attained by certain species of bird with regard to the programming of their movements. It is only the existence of a migratory programme in the genetic code of birds that can account for the extremely long and complicated journeys which very young birds, without any prior experience and without any guide, are able to accomplish.

This is in addition to their ability to return to their departure point on a prescribed date. Professor Hamburger in his book, *Power and Fragility (La Puissance et la Fragilité)*²⁸, gives as an example the well-known case of the 'mutton-bird' that lives in the Pacific, with its journey of over 16,500 miles in the shape of the figure 8²⁹. It must be acknowledged that the highly complicated instructions for a journey of this kind simply have to be contained in the bird's nervous cells. They are most definitely programmed, but who is the programmer?

The Source of the Constituents of Animal Milk

This is defined in the Qur'an in strict accordance with the data of modern knowledge (Surah 16, verse 66). The translation and interpretation of this verse given here is my own because even modern

translations habitually give it a meaning which is, in my opinion, hardly acceptable. Here are two examples:

- R. Blachère's translation:[30](#)

“Verily, in your cattle there is a lesson for you! We give you a pure milk to drink, excellent for its drinkers; (it comes) from what, in their bellies, is between digested food and blood.” (16:66)

- Professor Hamidullah's translation:[31](#)

“Verily, there is food for thought in your cattle. From what is in their bellies, among their excrement and blood, We make you drink pure milk, easy for drinkers to imbibe.” (16:66)

If these texts were shown to a physiologist, he would reply that they were extremely obscure, the reason being that there hardly appears to be much agreement between them and modern notions, even on a very elementary level. These translations are the work of highly eminent Arabists. It is a well-known fact however, that a translator, even an expert, is liable to make mistakes in the translation of scientific statements, unless he happens to be a specialist in the discipline in question. The most valid translation seems to me to be the following:

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

This interpretation is very close to the one given in the Muntakab, 1973, edited by the Supreme Council for Islamic Affairs, Cairo, which relies for its support on modern physiology. From the point of view of its vocabulary, the proposed translation may be justified as follows:

I have translated ‘inside their bodies’ and not, as R. Blachère and Professor Hamidullah have done, ‘inside their bellies’. This is because the word *Batn* also means ‘middle’, ‘interior of something’, as well as ‘belly’. The word does not here have a meaning that is anatomically precise. ‘Inside their bodies’ seems to concur perfectly with the context.

The notion of a ‘primary origin’ of the constituents of milk is expressed by the word *Min* (in English ‘from’) and the idea of a conjunction by the word *Baini*. The latter not only signifies ‘among’ but also ‘between’ in the other translations quoted. It is however also used to express the idea that two things or two people are brought together.

From a scientific point of view, physiological notions must be called upon to grasp the meaning of this verse. The substances that ensure the general nutrition of the body come from chemical transformations which occur along the length of the digestive tract. These substances come from the contents of the intestine. On arrival in the intestine at the appropriate stage of chemical transformation, they pass through its wall and towards the systemic circulation.

This passage is effected in two ways: either directly, by what are called the 'lymphatic vessels', or indirectly, by the portal circulation. This conducts them first to the liver, where they undergo alterations, and from here they then emerge to join the systemic circulation. In this way everything passes through the bloodstream.

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

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

The discovery of the circulation of the blood, was made by Harvey roughly ten centuries after the Qur'anic Revelation. I consider that the existence in the Qur'an of the verse referring to these concepts can have no human explanation on account of the period in which they were formulated.

7) Human Reproduction

From the moment ancient human writings enter into detail (however slight) on the subject of reproduction, they inevitably make statements that are inaccurate. In the Middle Ages, and even in more recent time, reproduction was surrounded by all sorts of myths and superstitions.

How could it have been otherwise, considering the fact that to understand its complex mechanisms, man first had to possess a knowledge of anatomy, the discovery of the microscope had to be made, and the so-called basic sciences had to be founded which were to nurture physiology, embryology, obstetrics, etc.

The situation is quite different in the Qur'an. The Book mentions precise mechanisms in many places and describes clearly, defined stages in reproduction, without providing a single statement marred by inaccuracy. Everything in the Qur'an is explained in simple terms which are easily understandable to man and in strict accordance with what was to be discovered much later on.

Human reproduction is referred to in several dozen verses of the Qur'an, in various contexts. It is explained through statements which deal with one or more specific points. They must be assembled to give a general idea of the verses as a whole, and here, as for the other subjects already examined, the commentary is in this way made easier.

Reminder Of Certain Basic Concepts

It is imperative to recall certain basic concepts which were unknown at the time of the Qur'anic Revelation and the centuries that followed. Human reproduction is effected by a series of processes which we share in common with mammals. The starting point is the fertilization of an ovule which has detached itself from the ovary. It takes place in the Fallopian tubes half-way through the menstrual cycle.

The fertilizing agent is the male sperm, or more exactly, the spermatozoon, a single fertilizing cell being all that is needed. To ensure fertilization therefore, an infinitely small quantity of spermatogenic liquid containing a large number of spermatozoons (tens of millions at a time) is required. This liquid is produced by the testicles and temporarily stored in a system of reservoirs and canals that finally lead into the urinary tract; other glands are situated along the latter which contribute their own additional secretions to the sperm itself.

The implantation of the egg fertilized by this process takes place at a precise spot in the female reproductive system: it descends into the uterus via a Fallopian tube and lodges in the body of the uterus where it soon literally implants itself by insertion into the thickness of the mucosa and of the muscle, once the placenta has been formed and with the aid of the latter. If the implantation of the fertilized egg takes place, for example, in the Fallopian tubes instead of in the uterus, pregnancy will be interrupted.

Once the embryo begins to be observable to the naked eye, it looks like a small mass of flesh at the centre of which the appearance of a human being is at first indistinguishable. It grows there in progressive stages which are very well known today; they lead to the bone structure, the muscles, the nervous system, the circulation, and the viscerae, etc. These notions will serve as the terms of reference against which the statements in the Qur'an on reproduction are to be compared.

Human Reproduction In The Qur'an

It is not easy to gain an idea of what the Qur'an contains on this subject. The first difficulty arises from the fact already mentioned, i.e. that the statements dealing with this subject are scattered throughout the Book. This is not however a major difficulty. What is more likely to mislead the inquiring reader is, once again, the problem of vocabulary.

In fact there are still many translations and commentaries in circulation today that can give a completely false idea of the Qur'anic Revelation on this subject to the scientist who reads them. The majority of translations describe, for example, man's formation from a 'blood clot' or an 'adhesion'. A statement of this kind is totally unacceptable to scientists specializing in this field.

In the paragraph dealing with the implantation of the egg in the maternal uterus, we shall see the reasons why distinguished Arabists who lack a scientific background have made such blunders. This

observation implies how great the importance of an association between linguistic and scientific knowledge is when it comes to grasping the meaning of Qur'anic statements on reproduction.

The Qur'an sets out by stressing the successive transformations the embryo undergoes before reaching its destination in the maternal uterus.

“O Man! Who deceives you about your Lord the Noble, Who created you and fashioned you in due proportion and gave you any form He willed.” (82:6-8)

“(God) fashioned you in (different) stages.” (71: 14)

Along with this very general observation, the text of the Qur'an draws attention to several points concerning reproduction which might be listed as follows:

- Fertilization is performed by only a very small volume of liquid.
- The constituents of the fertilizing liquid.
- The implantation of the fertilized egg.
- The evolution of the embryo.

a) Fertilization is Performed by Only a Very Small Volume of Liquid

The Qur'an repeats this concept eleven times using the following expression:

“(God) fashioned man from a small quantity (of sperm).” (16:4)

The Arabic word *Nutfa* has been translated by the words 'small quantity (of sperm)' because we do not have the terms that are strictly appropriate. This word comes from a verb signifying 'to dribble, to trickle'; it is used to describe what remains at the bottom of a bucket that has been emptied out. It therefore indicates a very small quantity of liquid. Here it is sperm because the word is associated in another verse with the word sperm.

“Was (man) not a small quantity of sperm which has been poured out?” (75:37)

Here the Arabic word *Mani* signifies sperm. Another verse indicates that the small quantity in question is put in a 'firmly established lodging' (*Qarar*) which obviously means the genital organs. God is speaking:

“Then We placed (man) as a small quantity (of sperm) in a safe lodging firmly established.” (23: 13)

It must be added that the adjective which in this text refers to the 'firmly established lodging' '*Makin*' is, I think, hardly translatable. It expresses the idea of a firmly established and respected place. However this may be, it refers to the spot where man grows in the maternal organism. It is important to stress the

concept of a very small quantity of liquid needed in the fertilization process, which is strictly in agreement with what we know on this subject today.

b) The Constituents of the Fertilizing Liquid

The Qur'an describes the liquid enabling fertilization to take place in terms which it is interesting to examine:

- 'Sperm', as has been stated precisely in 75, verse 37.
- 'A liquid poured out'.

“Man was fashioned from a liquid poured out” (86:6)

‘A despised liquid’ (32:8, 77:20)

The adjective 'despised' (*Mahin*) would, it seems, be interpreted not so much on account of the nature of the liquid itself, as more the fact that it is emitted through the outlet of the urinary tract, using the channels that are employed for passing urine.

- 'Mixtures' or 'mingled liquids' (*Amsaj*):

“Verily, we fashioned man from a small quantity of mingled liquids” (76:2)

Many commentators, like professor Hamidullah, consider these liquids to be the male and female agents. The same view was shared by older commentators, who could not have had any idea of the physiology of fertilization, especially its biological conditions in the case of the woman. They thought that the word simply meant the unification of the two elements.

Modern authors however, like the commentator of the Muntakab edited by the Supreme Council for Islamic Affairs, Cairo, have corrected this view and note here that the 'small quantity of sperm' is made up of various component parts. The commentator in the Muntakab does not go into detail, but in my opinion it is a very judicious observation.

What are the components parts of sperm? Spermatogenic liquid is formed by various secretions which come from the following glands:

- The testicles: the secretion of the male genital gland contains spermatozoons, which are elongated cells with a long flagellum; they are bathed in a sero-fluid liquid.
- The seminal vesicles, these organs are reservoirs of spermatozoons and are placed near the prostate gland; they also secrete their own liquid but it does not contain any fertilizing agents.
- The prostate gland: this secretes a liquid which gives the sperm its creamy texture and characteristic

odour.

- The glands annexed to the urinary tract: Cooper's or Méry's glands secrete a stringy liquid and Littré's glands give off mucous. These are the origins of the 'mingled liquids' which the Qur'an would appear to refer to.

There is, however, more to be said on this subject. When the Qur'an talks of a fertilizing liquid composed of different components, it also informs us that man's progeny will be maintained by something which may be extracted from this liquid. This is the meaning of verse 8, Surah 32:

“(God) made his progeny from the quintessence of a despised liquid.” (32:8)

The Arabic word, translated here by the word 'quintessence', is *Sulala*. It signifies 'something which is extracted, the issue of something else, the best part of a thing'. In whatever way it is translated, it refers to a part of a whole. Fertilization of the egg and reproduction are produced by a cell that is very elongated: its dimensions are measured in ten thousandths of a millimetre.

In normal conditions³², only one single cell among several tens of millions produced by a man will actually penetrate the ovule; a large number of them are left behind and never complete the journey which leads from the vagina to the ovule, passing through the uterus and Fallopian tubes. It is therefore an infinitesimally small part of the extract from a liquid whose composition is highly complex which actually fulfils its function. In consequence, it is difficult not to be struck by the agreement between the text of the Qur'an and the scientific knowledge we possess today of these phenomena.

c) The Implantation of the Egg In the Female Genital Organs

Once the egg has been fertilized in the Fallopian tube it descends to lodge inside the uterus; this is called the 'implantation of the egg'. The Qur'an names the lodging of the fertilized egg womb:

“We cause whom We ³³ will to rest in the womb for an appointed term.” (22:5)

The implantation of the egg in the uterus (womb) is the result of the development of villousities, veritable elongations of the egg, which, like roots in the soil, draw nourishment from the thickness of the uterus necessary to the egg's growth. These formations make the egg literally cling to the uterus. This is a discovery of modern times. The act of clinging is described five different times in the Qur'an. Firstly in verses 1 and 2 of Surah 96:

“Read, in the name of thy Lord Who fashioned, Who fashioned man from something which clings.” (96: 1-2)

'Something which clings' is the translation of the word *'Alaq*. It is the original meaning of the word. A meaning derived from it, 'blood clot', often figures in translation; it is a mistake against which one should guard: man has never passed through the stage of being a 'blood clot'.

The same is true for another translation of this term, 'adhesion' which is equally inappropriate. The original sense of 'something which clings' corresponds exactly to today's firmly established reality. This concept is recalled in four other verses which describe successive transformations from the small quantity of sperm through to the end:

“We have fashioned you from...something which clings.” (22:5)

“We have fashioned the small quantity (of sperm) into something which clings.” (23: 14)

“(God) fashioned you from a small quantity (of sperm), from something which clings.” (40:67)

“Was (man) not a small quantity of sperm which has been poured out? After that he was something which clings; then God fashioned him in due proportion.” (75:37–38)

The organ which harbours the pregnancy is qualified in the Qur'an by a word which, as we have seen, is still used in Arabic to signify the uterus. In some Surahs, it is called a 'lodging firmly established' (Surah 23, verse 13, quoted above and Surah 77, verse 21)³⁴.

d) Evolution of the Embryo inside the Uterus

The Qur'anic description of certain stages in the development of the embryo corresponds exactly to what we today know about it, and the Qur'an does not contain a single statement that is open to criticism from modern science. After 'the thing which clings' (an expression which is well-founded, as we have seen) the Qur'an informs us that the embryo passes through the stage of 'chewed flesh', then osseous tissue appears and is clad in flesh (defined by a different word from the preceding which signifies 'intact flesh').

“We fashioned the thing which clings into a chewed lump of flesh and We fashioned the chewed flesh into bones and We clothed the bones with intact flesh.” (23: 14)

'Chewed flesh' is the translation of the word *Mudga*; 'intact flesh' is *Lahm*. This distinction needs to be stressed. The embryo is initially a small mass. At a certain stage in its development, it looks to the naked eye like chewed flesh. The bone structure develops inside this mass in what is called the mesenchyma. The bones that are formed are covered in muscle; the word *Lahm* applies to them. Another verse which requires extremely delicate interpretation is the following:

“(God) fashions you inside the bodies of your mothers, formation after formation, in three (veils of) darkness.” (39:6)

(*Zulumat*) Modern interpreters of the Qur'an see in this verse the three anatomical layers that protect the infant during gestation: the abdominal wall, the uterus itself, and the surroundings of the foetus (placenta, embryonic membranes, amniotic fluid). I am obliged to quote this verse for the sake of completeness; the interpretation given here does not seem to me to be disputable from an anatomical point of view but is this what the text of the Qur'an really means?

It is known how certain parts appear to be completely out of proportion during embryonic development with what is later to become the individual, while others remain in proportion. This is surely the meaning of the word *Mukallaq* which signifies 'shaped in proportion' as used in verse 5, Surah 22 to describe this phenomenon.

“We fashioned...into something which clings...into a lump of flesh in proportion and out of proportion.” (22:5)

The Qur'an also describes the appearance of the senses and the viscerae:

“(God) appointed for you the sense of hearing, sight and the viscerae.” (32:9)

It refers to the formation of the sexual organs:

“(God) fashioned the two of a pair, the male and the female, from a small quantity (of sperm) when it is poured out.” (53:45-46)

The formation of the sexual organs is described in two Surah of the Qur'an:

“God created you from dust, then from a sperm-drop, then He made you pairs (the male and female).” (35: 11)

“And, (God) made of him a pair, the male and female.” (75:39)

As has already been noted, all statements in the Qur'an must be compared with today's firmly established concepts: the agreement between them is very clear. It is however very important to compare them with the general beliefs on this subject that were held at the time of the Qur'anic Revelation in order to realize just how far people were in those days from having views on these problems similar to those expressed here in the Qur'an.

There can be no doubt that they would have been unable to interpret the Revelation in the way we can today because we are helped by the data modern knowledge affords us. It was, in fact, only during the Nineteenth century that people had a slightly clearer view of this question.

Throughout the Middle-Ages, the most diversified doctrines originated in unfounded myths and speculations: they persisted for several centuries after this period. The most fundamental stage in the history of embryology was Harvey's statement (1651) that “all life initially comes from an egg”. At this time however, when nascent science had nevertheless benefited greatly (for the subject in hand) from the invention of the microscope, people were still talking about the respective roles of the egg and the spermatozoon.

Buffon, the great naturalist, was one of those in favour of the egg theory, but Bonnet supported the theory of the seeds being 'packed together'. The ovaries of Eve, the mother of the human race, were

supposed to have contained the seeds of all human beings, packed together one inside the other. This hypothesis came into favour in the Eighteenth century.

More than a thousand years before our time, at a period when whimsical doctrines still prevailed, men had a knowledge of the Qur'an. The statements it contains express in simple terms truths of primordial importance which man has taken centuries to discover.

The Qur'an And Sex Education

Our epoch believes that it has made manifold discoveries in all possible fields. It is thought that great innovations have been made in the field of sex education, and the knowledge of the facts of life which has been opened up to young people is regarded as an achievement of the modern world. Previous centuries were noted for their deliberate obscurity on this point and many people say that religion, without stating which religion, is the cause of it.

The information set out above is proof however that fourteen centuries ago theoretical questions (as it were) on human reproduction were brought to man's attention. This was done as far as was possible, taking into account the fact that the anatomical and physiological data needed for further explanations were lacking. One should also remember that, to be understood, it was necessary to use simple language suited to the level of comprehension of those who listened to the Preaching.

Practical considerations have not been silently ignored. There are many details in the Qur'an on the practical side of life in general, and the way man should behave in the many situations of his existence. His sex life is no exception. Two verses in the Qur'an deal with sexual relations themselves. They are described in terms which unite the need for precision with that of decency.

When translations and explanatory commentaries are consulted however, one is struck by the divergences between them. I have pondered for a long time on the translation of such verses, and am indebted to Doctor A. K. Giraud, Former Professor at the Faculty of Medicine, Beirut, for the following:

“(Man) was fashioned from a liquid poured out. It issued (as a result) of the conjunction of the sexual area of the man and the sexual area of the woman.” (86:6-7)

The sexual area of the man is indicated in the text of the Qur'an by the word *Sulb* (singular). The sexual areas of the woman are designated in the Qur'an by the word *Tara'ib* (plural). This is the translation which appears to be most satisfactory. It is different from the one that is often given by English and French translators, i.e.

“(Man) has been created by a liquid poured out which issues from between the vertebral column and the bones of the breast.” (86:6-7)

This would seem more to be an interpretation than a translation. It is hardly comprehensible. The behaviour of a man in his intimate relationships with his wife is stated explicitly. There is the order

concerning the menstruation period contained in verses 222 and 223, Surah 2; God gives the following command to the Prophet:

“They (the Believers) question thee concerning menstruation. Say: This is an evil. Keep away from women during menstruation and do not approach them until they are clean. When they have purified themselves, go to them, as God ordered it to you. “Verily, God loves the repentants and loves those who purified themselves. “Your wives are a tilth. Go to your tilth as you will. Do (some good act) for your souls beforehand.” (2:222–223)

The beginning of this passage is very clear in meaning: it formally forbids a man to have sexual contact with a woman who has her period. The second part describes the process of tilling which the sower performs before sowing the seed which is to germinate and produce a new plant. Through this image therefore, stress is indirectly laid on the importance of bearing in mind the final purpose of sexual contact, i.e. reproduction.

The translation of the final phrase is by R. Blachère: it contains an order which seems to refer to the preliminaries before sexual contact. The orders given here are of a very general kind. The problem of contraception has been raised with regard to these verses: neither here, nor anywhere else, is reference made to this subject.

Nor is provoked abortion referred to. The numerous passages quoted above on the successive transformations of the embryo make it quite clear, however, that man is considered to be constituted as of the stage described by the existence of 'something which clings'. This being so, the absolute respect of the individual human being, which is referred to so often in the Qur'an, brings with it a total condemnation of provoked abortion.

This attitude is today shared by all monotheistic religions. Sexual relations are permitted at night during the Fast in the month of Ramadan. The verse concerning Ramadan is as follows:

“Permitted to you, on the night of the fast, is to break chastity with your wives. They are a garment for you and you are a garment for them. So hold intercourse with them and seek what God has ordained for you.” (2: 187)

In contrast to this, no exception to the rule is made for pilgrims in Makkah during the celebration days of the Pilgrimage.

“For whom undertakes (the duty of) the Pilgrimage in its time, no wooing and no license.” (2: 197)

This prohibition is formal, as is the fact that other activities are forbidden, e.g. hunting, fighting, etc. Menstruation is again mentioned in the Qur'an in connection with divorce. The Book contains the following verse:

“For your wives who despair of menstruation, if you doubt about them, their period of waiting will

be three months. For those who never have their monthly periods and those who are pregnant their period will be until they lay down their burden.” (65:4)

The waiting period referred to here is the time between the announcement of the divorce and the time it comes into effect. Those women of whom it is said 'they despair of menstruation' have reached the menopause. A precautionary period of three months is envisaged for them. Once this period is completed, divorced women who have reached the menopause may remarry.

For those who have not yet menstruated, the pregnancy period has to be awaited. For pregnant women, divorce only comes into effect once the child is born. All these laws are in perfect agreement with physiological data. One can, furthermore, find in the Qur'an the same judicious legal provision in the texts dealing with widowhood.

Thus, the theoretical statements dealing with reproduction, and the practical instructions on the sex life of couples, do not contradict and cannot be placed in opposition to the data we have from modern knowledge, nor with anything that can be logically derived from it.

[1.](#) At a certain period of history, hostility to Islam, in whatever shape or form, even coming from declared enemies of the church, was received with the most heartfelt approbation by high dignitaries of the Catholic Church. Thus Pope Benedict XIV, who is reputed to have been the greatest Pontiff of the Eighteenth century, unhesitatingly sent his blessing to Voltaire. This was in thanks for the dedication to him of the tragedy Mohammed or Fanaticism (Mahomet ou le Fanatisme) 1741, a coarse satire that any clever scribbler of bad faith could have written on any subject. In spite of a bad start, the play gained sufficient prestige to be included in the repertoire of the Comédie-Française.

[2.](#) Lumen Gentium is the title of a document produced by the Second Vatican Council (1962–1966)

[3.](#) God.

[4.](#) Translators of the Qur'an, even famous ones, have not resisted the secular habit of putting into their translations things that are not really in the Arabic text at all. One can indeed add titles to the text that are not in the original without changing the text itself, but this addition changes the general meaning. R. Blachère, for example, in his well-known translation (Pub. Maisonneuve et Larose, Paris, 1966, page 115) inserts a title that does not figure in the Qur'an: Duties of the Holy War (Obligations de la guerre sainte). This is at the beginning of a passage that is indisputably a call to arms, but does not have the character that has been ascribed to it. After reading this, how can the reader who only has access to the Qur'an via translations fail to think that a Muslim's duty is to wage holy war?

[5.](#) Muhammad's departure from Makka to Madina, 622 A.D.

[6.](#) Muhammad was totally overwhelmed by these words. We shall return to an interpretation of them, especially with regard to the fact that Muhammad could neither read nor write.

[7.](#) In the text: Qur'an which also means 'reading'.

[8.](#) The absence of diacritical marks, for example, could make a verb either active or passive and in some instances, masculine or feminine. More often than not however, this was hardly of any great consequence since the context indicated the meaning in many instances.

[9.](#) The Biblical description mentioned here is taken from the so-called Sacerdotal version discussed in the first part of this work; the description taken from the so called Yahvist version has been compressed into the space of a few lines in today's version of the Bible and is too insubstantial to be considered here.

[10.](#) 'Sabbath' in Hebrew means 'to rest'.

[11.](#) See table on last page of present work for equivalence between Latin and Arabic letters.

[12.](#) It is to be noted that while the Bible calls both Sun and Moon 'lights', here, as always in the Qur'an, they are differently named; the first is called 'Light' (nur) and the second is compared in this verse to a 'lamp (siraj) producing light'. We shall

see later how other epithets are applied to the Sun.

[13.](#) Apart from the Qur'an, we often find the number 7 meaning plurality in texts from Muhammad's time, or from the first centuries following him, which record his words (Ahadith).

[14.](#) This statement that the Creation did not make God at all weary stands out as an obvious reply to the Biblical description, referred to in the first part of the present book, where God is said to have rested on the seventh day from the preceding days' work!

[15.](#) As regards the Moon, its gradual separation from the Earth following the deceleration of its rotation is an acknowledged probability.

[16.](#) This text completely overshadows the few lines contained in the Yahvist version. The latter is too brief and too vague for the scientist to take account of it.

[17.](#) Pub. Presses Universitaires de France, Paris, 1952.

[18.](#) I have often heard those who go to great lengths to find a human explanation—and no other—to all the problems raised by the Qur'an say the following: "if the Book contains surprising statements on astronomy, it is because the Arabs were very knowledgeable on this subject." In so doing they forget the fact that, in general, science in Islamic countries is very much post-Qur'an, and that the scientific knowledge of this great period would in any case not have been sufficient for a human being to write some of the verses to be found in the Qur'an. This will be shown in the following paragraphs.

[19.](#) Here, the sky and a star are used to bear witness to the importance of what is to come in the text.

[20.](#) It is known that when a meteorite arrives at the upper layers of the atmosphere, it may produce the luminous phenomenon of a 'shooting star'.

[21.](#) Pub. Sh. Muhammad Ashraf, Lahore (Pakistan)

[22.](#) This verse is followed by an invitation to recognize God's blessings. It forms the subject of the whole of the Surah that bears the title 'The Beneficent'.

[23.](#) Whenever the pronoun 'We' appears in the verses of the text quoted here, it refers to God.

[24.](#) 1. The city of Sanaa, the capital of the Yemen, was inhabited in Muhammad's time. It lies at an altitude of nearly 7,900 feet above sea level.

[25.](#) It is secreted by the reproductive glands and contains spermatozoons.

[26.](#) We saw in the Introduction to the third part of this book what one was expected to believe about predestination in its application to man himself.

[27.](#) One might note in passing, that this last verse is the only one in the Qur'an that refers to the possibility of a remedy for man. Honey can indeed be useful for certain diseases. Nowhere else in the Qur'an is a reference made to any remedial arts, contrary to what may have been said about this subject.

[28.](#) Pub. Flammarion, 1972, Paris.

[29.](#) It makes this journey over a period of six months, and comes back to its departure point with a maximum delay of one week.

[30.](#) Pub. G. P. Maisonneuve et Larose, 1966, Paris,

[31.](#) Pub. Club Français du Livre, 1971, Paris.

[32.](#) It is estimated that in one cubic centimetre of sperm there are 25 million spermatozoons with, under normal conditions, an ejaculation of several cubic centimetres.

[33.](#) God is speaking

[34.](#) In another verse (Surah 6, verse 98) a place of sojourn is mentioned. It is expressed in a term very similar to the preceding one and would also seem to signify the maternal uterus. Personally, I believe this to be the meaning of the verse, but a detailed interpretation would involve much lengthier explanation which is beyond the scope of this book.

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