

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:—sura 6, verse 95:

“Verily, God splits the grain and the fruit-stone.”

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:

—sura 36, verse 36:

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

One could form many hypotheses concerning the meaning of the ‘things men did not know’ in 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.

—sura 16, verses 5 to 8:

“(God) created cattle for you and (you find) in them warmth, useful services and food, sense of beauty when you bring them

home and when you take them to pasture. They bear your heavy loads to lands you could not reach except with great personal effort. Verily, your Lord is Compassionate and Merciful; (He created) horses, mules and donkeys for you to ride and for ornament. And He created what you do not know.”

Alongside these general remarks, the Qur’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.

1. Reproduction in the Animal Kingdom.

This is very summarily dealt with in verses 45 and 46, sura 53:

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

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

2. References to the Existence of Animal Communities.

—sura 6, Verse 38

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

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 general¹

1. 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.

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. Sheik Si Boubakeur Hamza, in the commentary to his translation of the Koran, speaks of "the instinct which, according to Divine Wisdom, pushes all beings to group together, so that they demand that the work of each member serve the whole group."

Animal behaviour has been closely investigated in recent decades, with the result that genuine animal communities have been shown to exist. 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.

3. 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 :

—Sura 16, verses 68 and 69:¹

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

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

—sura 29, verse 41:

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

A spider's web is indeed constituted of silken threads secreted by the animal's glands and their 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.

1. 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.

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:

—sura 6 verse 38:

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

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

—sura 16, verse 79:

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

—sura 67, verse 19:

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

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

An illuminating comparison can be made between these verses, which stress the extremely close dependence of the birds' behavior on divine order, to modern data showing the degree of perfection attained by certain species of bird with regard to the programming of their movements. It is only the existence of a migratory programme in the genetic code of birds that can account for the extremely long and complicated journeys which very young birds, without any prior experience and without any guide, are able to accomplish. This is in addition to their ability to return to their departure point on a prescribed date. Professor Hamburger in his book, *Power and Fragility* (La Puissance et la

Fragilitéé)¹, gives as an example the well-known case of the 'mutton-bird' that lives in the Pacific, with its journey of over 15,500 miles in the shape of the figure 8². 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?

4. *The Source of the Constituents of Animal Milk.*

This is defined in the Qur'an in strict accordance with the data of modern knowledge (sura 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:³

"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."

—Profcssor Hamidullah's translation:⁴

"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."

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

1. Pub. Flammarion, 1972, Paris.

2. It makes this journey over a period of six months, and comes back to its departure point with a maximum delay of one week.

3. Pub. G. P. Maisonneuve et Larose, 1966, Paris,

4. Pub. Club Français du Livre, 1971, Paris.

between the contents of the intestine and the blood, a milk pure and pleasant for those who drink it." (sura 16, verse 66)

This interpretation is very close to the one given in the *Mun-takab*, 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 *baṭn* 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.