

The Honey Bee

H A R U N Y A H Y A



It is well known by almost everyone that honey is a fundamental food source for the human body, whereas only a few people are aware of the extraordinary qualities of its producer, the honeybee.

As we know, the food source of bees is nectar, which is not found during winter. For this reason, they combine the nectar collected in summer time with special secretions of their body, produce a new nutrient - honey - and store it for the coming winter months.

It is noteworthy that the amount of honey stored by bees is much greater than their actual need. The first question that comes to mind is why do the bees not give up this "excess production", which seems a waste of time and energy for them? The answer to this question is hidden in the "inspiration" stated in the verse to have been given the bee.

Bees produce honey not only for themselves but also for human beings. Bees, like many other natural beings, are also dedicated to the service of man, just as the chicken lays at least one egg a day although it does not need it, and the cow produces much more milk than its offspring needs.

And He has made everything in the heavens and everything in the earth subservient to you. It is all from Him. There are certainly signs in that for people who reflect.
(Surat al-Jathiyah: 13)

EXCELLENT ORGANIZATION IN THE HIVE

The bees' lives in the hive and their honey production are fascinating. Without going into too much detail, let us discover the basic features of the "social life" of bees. Bees must carry out numerous "tasks" and they manage all of them with excellent organization.

Regulation of humidity and ventilation: The humidity of the hive, which gives honey its highly protective quality, must be kept within certain limits. If humidity is over or under those limits, then the honey is spoiled and loses its protective and nutritious qualities. Similarly, the temperature in the hive has to be 32° C throughout 10 months of the year. In order to keep the temperature and humidity of the hive within certain limits, a special group takes charge of "ventilation".

On a hot day, bees can easily be observed ventilating the hive. The entrance of the hive fills with bees and clamping themselves to the wooden structure, they fan the hive with their wings. In a standard hive, air entering from one side is forced to leave from the other side. Extra ventilator bees work within the hive to push the air to all corners of the hive.

This ventilation system is also useful in protecting the hive from smoke and air pollution.

Health system: The efforts of the bees to preserve the quality of honey are not limited to the regulation of humidity and heat. A perfect healthcare system exists within the hive to keep all events that may result in the production of bacteria under control. The main purpose of this system is to remove all substances likely to cause bacteria production. The basic principle of this health system is to prevent foreign substances from entering the hive. To secure this, two guardians are always kept at the entrance of the hive. If a foreign substance or insect enters the hive despite this precaution, all bees act to remove it from the hive.

For bigger foreign objects that cannot be removed from the hive, another protection mechanism is used. Bees "embalm" these foreign objects. They produce a substance called "propolis (bee resin)" with which they carry out the "embalming" process. Produced by adding special secretions to the resins they collect from trees like pine, poplar and acacia, the bee resin is also used to patch cracks in the hive. After being applied to the cracks by the bees, the resin dries as it reacts with air and forms a hard surface. Thus, it can stand against all kinds of external threats. Bees use this substance in most of their work.

At this point, many questions spring to mind. Propolis has the feature of not allowing any bacteria to live in it. This makes propolis an ideal substance for embalming.

And in your creation and all the creatures He has scattered about there are signs for people with certainty. (Surat al-Jathiyah: 4)

It is evident that the bee has neither any knowledge on this subject, nor a laboratory in its body. The bee is only an insect 1-2 cm in size and it only does that with which its Lord has inspired it.



How do bees know that this substance is an ideal substance for embalming? How do bees produce a substance, which man can only produce in laboratory conditions and with the use of technology if he has a certain level of knowledge of chemistry? How do they know that a dead insect causes bacteria production and that embalming will prevent this?

MAXIMUM STORAGE WITH MINIMUM MATERIAL

Bees construct hives in which 30,000 bees can live and work together by shaping small portions of beeswax.

The hive is made up of beeswax-walled honeycombs, which have hundreds of tiny cells on each of their faces. All honeycomb cells are exactly the same size. This engineering miracle is achieved by the collective work of thousands of bees. Bees use these cells for food storage and the maintenance of young bees.

Bees have been using the hexagonal structure for the construction of honeycombs for millions of years. (A bee fossil has been found dating from 100 million years ago). It is astonishing that they have chosen a hexagonal structure rather than an octagonal, or pentagonal. Mathematicians give the reason: "the hexagonal structure is the most suitable geometric form for the maximum use of unit area." If honeycomb cells were constructed in another form, then there would be areas left unused; thus, less honey would be stored, and fewer bees would be able to benefit from it.

As long as their depths are the same, a triangular or quadrangular cell would hold the same amount of honey as a hexagonal cell. However, among all these geometric forms, the hexagonal has the shortest circumference. Whilst they have the same volume, the amount of wax required for hexagonal cells is less than the amount of wax required for a triangular or quadrangular one.

The conclusion: hexagonal cells require minimal amounts of wax in terms of construction while they store maximal amounts of honey. Bees themselves surely cannot have calculated this result, obtained by man after many complex geometrical calculations. These tiny animals use the hexagonal form innately, just because they are taught and "inspired" so by their Lord.

The hexagonal design of cells is practical in many respects. Cells fit to one another and they share each other's walls. This, again, ensures maximum storage with minimum wax. Although the walls of the cells are rather thin, they are strong enough to carry a few times their own weight.

As well as in the walls of the sides of the cells, bees also take the maximum saving principle into consideration while they construct the bottom edges.

Combs are built as a slice with two rows lying back to back. In this case, the problem of the junction point of two cells occurs. Constructing the bottom surfaces of cells by combining three equilateral quadrangles solves this problem. When three cells are built on one face of the comb, the bottom surface of one cell on the other face is automatically constructed.

As the bottom surface is composed of equilateral quadrangular wax plaques, a downward deepening is observed at the bottom of those cells made by this method. This means an increase in the volume of the cell and, thus, in the amount of

honey stored.

OTHER CHARACTERISTICS OF HONEY COMB CELLS

Another point that bees consider during the construction of the honeycomb is the inclination of cells. By raising cells 13° on both sides, they prevent the cells from being parallel to the ground. Thus, honey does not leak out from the mouth of the cell.

While working, worker bees hang onto each other in circles and congregate together in bunches. By doing this, they provide the necessary temperature for wax production. Little sacks in their abdomens produce a transparent liquid, which leaks out and hardens the thin wax layers. Bees collect the wax with the little hooks on their legs. They put this wax into their mouths, and chew and process it until it softens enough and so give it shape in the cells. Many bees work together to ensure the required temperature for the work place in order to keep the wax soft and malleable.

There is another interesting point to note: the construction of the honeycomb starts from the upper side of the hive and continues simultaneously in two or three separate rows downward. While a honeycomb slice expands in two opposite directions, first the bottom of its two rows join. This process is realized in an astonishing harmony and order. Therefore, it is never possible to understand that the honeycomb actually consists of three separate parts. The honeycomb slices, which started simultaneously from different directions, are so perfectly arranged that, although there are hundreds of different angles in its structure, it seems like one uniform piece.

For such a construction, bees need to calculate the distances between the starting and connection points in advance and then design the dimensions of the cells accordingly. How can such a delicate calculation be done by thousands of bees? This has always impressed scientists.

It is obviously irrational to assume that bees have solved this task, which man can hardly manage. There is such a delicate and detailed organization involved that it is impossible for them to carry it out on their own.

So how do they achieve this? An evolutionist would explain that this event has been achieved by "instinct". However, what is the "instinct" that can address thousands of bees at the same time and make them perform a collective task? It would not be sufficient even if each bee acted on its own "instinct", since what they do would necessarily have to be in concordance with each other's instincts in order to achieve this astonishing result. Due to this, they must be acted by an "instinct" coming from a unique source. Bees, who start constructing the hive from different corners and then combine their separate tasks without leaving any gaps and having all the cells constructed equally in a perfect hexagonal structure, must certainly be receiving "instinctive" messages from the very same source!...

The term "instinct" used above is "only a name" as mentioned in the Qur'an, in the 40th verse of Surah Yusuf. It is of no use insisting on such "mere names" in order to conceal clear truths. Bees are guided from a unique source and thus they successfully come to perform tasks which they otherwise would not be able to. It is not instinct, a term with no definition, that guides bees but the "inspiration" mentioned in Surat an-Nahl. What these tiny animals do is implement the programme that Allah has particularly set for them.

HOW THEY DETERMINE THEIR DIRECTION

Bees usually have to fly long distances and scan large areas to find food. They collect flower pollens and the constituents of honey within a range of 800m of the hive. A bee, which finds flowers, flies back to its hive to let others know about their place, but how will this bee describe the location of the flowers to the other bees in the hive?

By dancing!... The bee returning to the hive starts to perform a dance. This dance is a means of expression, which it uses to tell the other bees the location of the flowers. This dance, repeated many times by the bee, includes all the information about the inclination, direction, distance and other details of the food source that enable other bees to reach it.

This dance is actually a figure "8" constantly repeated by the bee (see picture above). The bee forms the middle part of the figure "8" by wagging its tail and performing zigzags. The angle between the zigzags and the line between the sun and the hive gives the exact direction of the food source (see picture above).

However, knowing only the direction of the food source is not enough. Worker bees also need to "know" how far they have to travel to collect the ingredients for the honey, so, the bee returning from the flower source, "tells" the other bees the distance of the flower pollens by means of certain body movements. It does this by wagging the bottom part of its body and creating air currents. For example, in order to "describe" a distance of 250m, it wags the bottom part of its body 5

times in half a minute. This way, the exact location of the source is made clear in detail, both with respect to its distance and its orientation.

A new problem awaits the bee in those flights where the round trip to the food source takes a long time. As the bee, who can only describe the food source according to the position of the sun, goes back to its hive, the sun moves 1 degree every 4 minutes. Eventually, the bee will make an error of 1 degree for each four minutes it spends on the way about the position of the food source of which it informs the other bees.

Astonishingly, the bee does not have such a problem! The bee's eye is formed of hundreds of tiny hexagonal lenses. Each lens focuses on a very narrow area just like a telescope does. A bee looking towards the sun at a certain time of the day can always find its location while it flies. The bee is reckoned to do this calculation by making use of the change in the light emitted by the sun depending on the time of the day. Consequently, the bee determines the position of the target location without mistake by making corrections in the information it gives in the hive as the sun moves forward.

METHOD OF MARKING FLOWERS

When a flower has already been visited, the honeybee can understand that another bee has earlier consumed the nectar of that flower, and leave the flower immediately. This way, it saves both time and energy. Well, how does the bee understand, without checking the flower, that the nectar has earlier been consumed?

This is made possible because the bees which visited the flower earlier marked it by leaving a drop on it with a special scent. Whenever a new bee looks in on the same flower, it smells the scent and understands that the flower is of no use and so goes on directly towards another flower. Thus, bees do not waste time on the same flower.

THE MIRACLE OF HONEY

Do you know how important a food source the honey is, which Allah offers man by means of a tiny insect? Honey is composed of sugars like glucose and fructose and minerals like magnesium, potassium, calcium, sodium, chlorine, sulphur, iron and phosphate. It contains vitamins B1, B2, C, B6, B5 and B3 all of which change according to the qualities of the nectar and pollen. Besides the above, copper, iodine, and zinc exist in it in small quantities. Several kinds of hormones are also present in it.

**From their bellies comes a drink of varying colours, containing healing for mankind...
(Surat an-Nahl: 69)**

**We have made them (livestock) tame for them and some they ride and some they eat. And they have other uses in them and milk to drink. So will they not show thanks?
(Surah Yasin: 72-73)**

As Allah says in the Qur'an, honey is a "healing for men". This scientific fact was confirmed by scientists who assembled during the World Apiculture Conference held from 20-26 September 1993 in China. During the conference, treatments with honey derivatives were discussed. American scientists in particular said that honey, royal jelly, pollen and propolis (bee resin) cure many diseases. A Romanian doctor stated that he tried honey on cataract patients, and 2002 out of his 2094 patients recovered completely. Polish doctors also informed the conference that bee resin helps to cure many diseases such as hemorrhoids, skin problems, gynecological diseases and many other disorders.

Nowadays, apiculture and bee products have opened a new branch for research in countries advanced in science. Other benefits of honey may be described as below:

Easily digested: Because sugar molecules in honey can convert into other sugars (e.g. fructose to glucose), honey is easily digested by the most sensitive stomachs, despite its high acid content. It helps kidneys and intestines to function better.

Has a low calorie level: Another quality of honey is that, when it is compared with the same amount of sugar, it gives 40% less calories to the body. Although it gives great energy to the body, it does not add weight.

Rapidly diffuses through the blood: When accompanied by mild water, honey diffuses into the bloodstream in 7 minutes. Its free sugar molecules make the brain function better since the brain is the largest consumer of sugar.

Supports blood formation: Honey provides an important part of the energy needed by the body for blood formation. In addition, it helps in cleansing the blood. It has some positive effects in regulating and facilitating blood circulation. It also functions as a protection against capillary problems and arteriosclerosis.

Does not accommodate bacteria: This bactericide (bacteria-killing) property of honey is named "the inhibition effect". Experiments conducted on honey show that its bactericide properties increase twofold when diluted with water. It is very interesting to note that newly born bees in the colony are nourished with diluted honey by the bees responsible for their supervision - as if they know this feature of the honey.

Royal Jelly: Royal jelly is a substance produced by worker bees inside the beehive. Inside this nutritious substance are sugar, proteins, fats and many vitamins. It is used in problems caused by tissue deficiency or body frailty.

It is obvious that honey, which is produced in much higher amounts than the requirements of the bees, is made for the benefit of man. And it is also obvious that bees cannot perform such an unbelievable task "on their own."