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Memetics of the Computer Universe Based on the Quran

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ABSTRACT

The emerging concept of computer universe has the potential to bring about a radical change in our perception of the world. Energy is word of God that carries His commands. It derives its properties in accordance with the divine instructions immanent in it. Memetics is the science of information carried by the entity called energy. Living and non-living systems represent two different languages in which information content of energy exists. These may be distinguished as bioprogram (biological information) and abioprogram (chemical information) respectively. While abioprogram can be explained in terms of a structure-code concept, the bioprogram is intangible to human beings and is stored on the chromosomes of the cell. It is non-physical in nature but requires a physical medium for its storage like the computer program. An organism is natural biocomputer or biorobot. All organisms except Homo sapiens are totally programmed unconscious systems like man-made robot. Man is the only conscious, freewilled robot (abd in Arabic) of God. Consciousness and freewill are the attributes of the unique processor of human being, the mind (qalb in Arabic). The computer model of the organism helps us to define and explain the phenomena of life and death. The phenomenon of life is the manifestation of the execution of the biosoftware while death is the result of deletion of the biosoftware. A dead body is like a computer without software. Man-made computer, robot, etc., which run on man-made software are forms of "artificial life". The basic change that the computer concept of the universe brings into our present knowledge of the universe and cosmology is that it is the divine information carried in energy that represents the underlying reality of the universe.

Keywords: *Computer Universe, Memetics, Abiomemetics, Biomemetics, Phenomena of Life and Death, Natural Biosoftware Engineering*

1. Introduction

The universe presents itself a self-propelled, self-regulated, self-sustained system. An organised reality exists in nature. The countless number of celestial bodies of colossal size tracing their own paths in the cosmos without collision in its 13.75-billion-year history is indicative of a perfectly programmed behaviour. The gravitational force responsible for this meticulous and amazing consistency in the peripheral motion and recurring relative positions of stars and planets do not operate in an arbitrary manner, but obey certain laws prescribed by the Creator. It is because of this, we are able to formulate principles which can reflect the natural order. The high degree of success achieved by man-made mathematical models in describing and/or predicting several natural phenomena adds strength to this reasoning. Every natural process is spontaneous phenomenon. Physical, chemical and biological processes are spontaneous as though the reacting species know what they should produce under different conditions. Their properties and mode of behaviour in diverse environments are fixed. A plant or an animal develops through execution of instructions in the sequence specified in the program stored in its starting cell (e.g., zygote, seed, etc.). All these are suggestive of a computerised setup. Although science covers many aspects of the universe from subatomic level to galaxies and beyond, there are certain fundamental questions like what is energy, how the various components of the universe acquired their characteristic properties, how the laws and rules governing them came into being, what is life, what is death, etc., that remain unanswered in science. These issues constitute some of the "fundamental unknowns" about the universe that can be unravelled by resorting to a computer model in conjunction with the Quran. This paper addresses these issues and

presents a summary of my work in this line [1,2].

2. The Computer Universe

The universe is a computer designed, programmed and created by God. Konrad Zuse who built the first programmable computer was the first to suggest in 1967 that the entire universe was being computed on a computer, possibly a cellular automaton [3]. He referred to this as "Rechnender Raum" (Computing Cosmos or Computing Space), which in fact started the field of digital physics. Jurgen Schmidhuber of Dalle Molle Institute for Artificial Intelligence (IDSIA), Switzerland, proposes an algorithmic theory of everything. Schmidhuber assumes: "a long time ago, the Great Programmer wrote a program that runs all possible universes on His Big Computer….Each universe evolves on a discrete time scale….Any universe's state at a given time is describable by a finite number of bits" [4]. In 1998, I proposed a computer model of the universe in the light of the Quran in my book *The Divine Expert System* [5]. Both physical universe and biological organisms have been described as natural computer systems. Four years later, Seth Loyd of Massachusetts Institute of Technology, USA, published a paper suggesting that the universe is a quantum computer [6]. He also elaborated the concept in his subsequent book [7]. Another notable work in this field is that of Stephen Wolfram from USA [8]. According to him, all of reality might result from a kind of algorithm, like a computer program being enacted again and again on the underlying building blocks of space and matter. He argues that the whole universe can be viewed as one huge cellular automaton. Recently Denis Bray suggested every living cell is a computer [9].

3. Memetics of the Universe

Memetics is science of information based on the computer model of the universe. The universe is energy-filled space. Energy is information. No one knows the fundamental nature of the entity called energy. Energy lies in the realm of the unknown (*i.e.*, intangible to humans). For practical purposes we define energy in terms of its manifested characteristics. A well-known definition of energy is that given by Dave Watson: "Energy is a property or characteristic (or trait or aspect?) of matter that makes things happen, or, in the case of stored or potential energy, has the "potential" to make things happen" [10]. Energy exists in various forms such as matter, kinetic energy, potential energy, heat, magnetism, electricity, electromagnetic radiation, sound, etc. All these forms have been described the way we perceive.

The Quran informs us that when God wants to create a thing, He says "be to it and it comes into being" (Q. 2:117). Note that God says "be" to "the thing" He wants to create. This means that the thing to be created is already there in a virtual form (intangible to man). From the Quran, it is possible to infer that the virtual form is nothing but God's words. The word of God is instruction or command (Q. 11:44) and His words are infinite: "And if all the trees on earth were pens and the ocean (were ink), with seven oceans behind it to add to its (supply), yet would not the words of Allah be exhausted (in the writing): for Allah is exalted in power, full of wisdom." (Q. 31:27). God's words form the instructions (programs) in intangible form, which we call energy. Therefore, energy is God's word that represents the divine software (commands or instructions).

In the light of these revelations, the phenomenon of creation can be explained in terms of a *ghayb-shahadat* paradigm. The verse 31:27 indicates the existence of a large collection of God's words (intangible energy). These in fact constitute the divine programs for whatever thing God wants to create. The word "it" in the verse 2:117 given above refers to the divine program concerned. That is, when God wants to create a thing, He needs say only "be" to "it" (*i.e.*, the appropriate program of the thing to be created) and "it comes into being" (i.e., it becomes tangible to man). This implies that when God gives the command "be" to the intangible (*ghayb* in Arabic) program of a thing to be created, it transforms itself into the form tangible (*shahadat* in Arabic) to man; i.e., into the form which human mind can process and interpret. The mind deciphers it in accordance with the human biosoftware, which results in conscious perception. The universe is therefore what human mind constructs as stipulated in the biosoftware. The phenomenon of creation can therefore be conceived as the transformation of intangible energy into tangible form. This is much like the production of a hardcopy (*shahadat*) of an intangible (*ghayb*) document by a computer when a command is given to it.

Two categories of universal components namely, non-living and living, can be distinguished. The non-living systems may be thought of as being run on abioprogram (chemical information) and the living systems on bioprogram (biological information). These are the two basic forms in which information exist in the universe. The unit of information (*i.e.*, energy) may be represented as "meme". The term "meme" was introduced by Richard Dawkins to mean "replicator" [11]. However the term is used here not with the connotation of a "replicator" or with the other characteristics originally assigned to it. *Meme is defined here as a piece of information (energy) in the abiotic and biotic segments of the universe.* The meme based on abioprogram may be referred to as "abiomeme" and the meme based on bioprogram may be called "biomeme" [2].

3.1 Abiomemetics

Abiomemetics is science of chemical information. It can be best understood in terms of a structure-code concept, which is illustrated here taking the example of matter form of energy. The atom is considered here as the basic unit of matter for illustrating the concept (**Table 1**). The structure signifies a code "written" in a special language (abioprogram) like the symbolic language used in computer machines. The semantic content of the code is deciphered in accordance with the abioprogram and the structure derives its properties. The Quranic message that the universal components carry God's commands (Q. 41:12) can be explained in this way. The numerous substances found in the universe owe their vastly diverse properties to their structures, which, in turn, are decided by the composition and arrangement of atoms. Structure at the level of a molecule (substance) is the totality of nuclide composition and arrangement of the atoms. In the structure-code concept, nuclides form the alphabets and along with their arrangement, as in a word, through bonding, etc., the code is deciphered in terms of its properties (**Figure 1**). A set of alphabets can carry meaning only if it has affiliation with a language. The meaning of a word depends on its alphabetic composition as well as the order in which they are arranged. Two words may be different in their alphabetic composition or in their arrangements. For instance, English words "nest" and "sent" have the same alphabets but different arrangements whereas the words "take" and "buy" are different in their alphabetic composition. Likewise, different chemical structures are formed based on the composition and arrangement of the atoms of the elements. The structures of n-butane and iso-butane have the same elements and same number of atoms with the chemical formula of C_4H_{10}; but the arrangement of the atoms is different in the two substances. These two structures correspond to English words "nest" and "sent". The chemical structures of water (H_2O) and benzene (C_6H_6) are different in their elemental (alphabet) composition. They are comparable with English words "take" and "buy" (**Figure 1**). By this analogy, the phenomenon of how chemical structures (substances) acquire their properties based on the divine abioprogram can be explained. Periodicity in the properties of elements which provide the basis for their classification (Periodic Table) and also for the prediction of properties of a hitherto unknown element; specificity in the change of properties of a substance with a change in structure, etc., are clearly the clauses of the abioprogram operating at different levels of structural hierarchy. Recognition of at least some of these rules is now helping us in the search for new compounds with specific properties. For instance, computer-aided molecular modelling (CAMM) has become a powerful tool for studying virtually any chemical structure. The method works on the reverse logic of structure-property relationships. In this case, we specify the properties; the computer will give us the structure of the molecule in return. Use of this technique in the search for new drugs has enabled the researchers to cut short the long list of candidate molecules to a smaller number expected to have the required biological activity. In fact by studying the structure-property relationships, we are deciphering the abioprogram at various hierarchal levels of the universe. The chemical structure may be thus likened to a kind of algorithm conforming to the abioprogram. The universe is therefore nothing but information-laden system.

Table 1. Property acquisition by non-living matter (abiomeme) based on structure-code concept.

Building block	Meme	Software	Function
Alphabet	Word	English	Meaning
Element	Molecule	Abioprogram	Properties

Note: Atom is taken as the unit of matter for convenience in illustrating the principle.

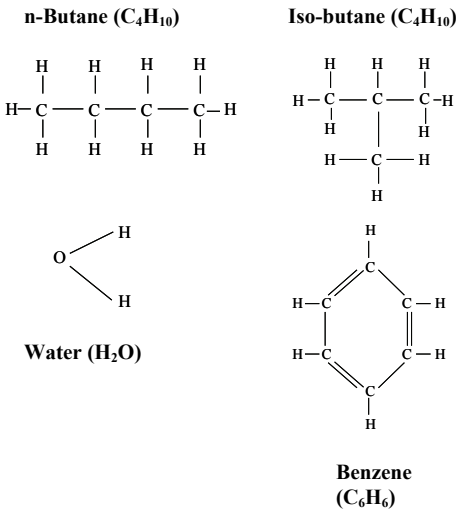

Figure 1. Representation of chemical structures as abiomemes.

3.2 Biomemetics

Biomemetics is science of biological information. Biosystems carry divine instructions in a different way. "Breathing of *rooh*" into a clay model to create man (Adam) mentioned in the Quran (Q. 15:26-29) and "breathing of life" mentioned in the Bible (Genesis 2:7) refer to one and the same event – installation of divine biosoftware in a clay model of man. Upon installation of the *rooh* (the term *nafs* is also used in the Quran in the

context of man) in that non-living clay model, it sprang to life much like a lifeless computer springs to "life" when software is installed. Software is the invisible soul of a computer. Similarly, the invisible soul of an organism is its biosoftware. The Scriptural revelations make clear distinction between the way in which God's instructions (programs) are carried by the non-living and living components of the universe. The Quran further informs us that it is the removal (or in computer parlance, "deletion") of the *nafs* (biosoftware of human being) that causes death (Q. 6:93). In other words, a dead body is like a computer without software.

A system is said to be "living" if it carries software. Therefore the phenomenon of life can be defined as the manifestation of the execution of the program. Going by this definition, all the so-called non-living and living systems are in reality "living systems" in their own right as they do carry divine programs. The physical universe is in reality a "living system" as it operates on the abioprogram. We may distinguish the so-called "living" and "non-living" systems as two different forms of life as they are operated on different software. However, we shall retain the conventional terms "living" and "non-living" for convenience. Computer, robot, etc., are also living systems as they work on man-made programs. We may distinguish them as forms of "artificial life".

4. Organism—Natural Biocomputer or Biorobot

An organism is a biocomputer or biorobot depending on its configuration. The biological program (bioprogram) at the level of the species is termed microbioprogram. Microbioprogram at the level of the member of a species is termed biomemome. Cell is biochip, the organisational unit of the biosystem. The cell has both hardware and biosoftware. The hardware is produced in the cell as per the program appropriate to execute the program. The chemical structures (including DNA) in the cell constitute the hardware while biosoftware is stored on the chromosomes as invisible information. At the level of the organism, tissues and organs make the hardware.

A distinguishing feature of the bioprogram from abioprogram is that while abioprogram is encoded by the structure, bioprogram requires a physical medium for its storage as in our computer. The chromosomes in the body cells serve as the storage device (hard disk) of the biosystem. The arrangement of biomemes on the chromosomes, *i.e.*, biomemory organization may be viewed as the "biomemogram" of a species (**Figure 2**). Although we may get some broad idea of memetic allocation on the chromosomes (e.g., allelic loci) by studying the inheritance pattern of characters through breeding trials, it is not possible to map out their storage pattern on the biomemory. A memory sector on the chromosome may

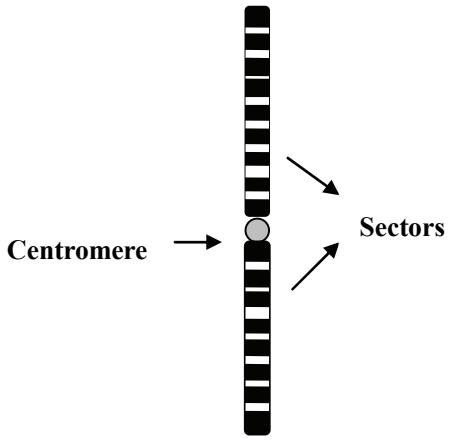

Figure 2. Biomemory organization on a chromosome.
Note: The chromosome (biomemory) is divided into many sectors.

be storing one or more biomemes that constitute the program for a specific biological activity or function. It is the totality of the biomememetic package that makes the biomememome of the individual.

An organism may be unichipped, *i.e.*, unicellular (e.g., bacteria) or multichipped, *i.e.*, multicellular (e.g., plants, animals). Multicellular organisms like animals are functionally comparable with man-made robots. They can be categorised as biorobots as they are totally programmed unconscious biosystems. On the other hand man can be described as the conscious, intelligent, freewilled robot of God in the light of the Quranic revelations [1,2].

God created man to serve Him. Man is addressed by God as "*abd*" meaning servant (Q. 51:56). The Arabic word *abd* is synonymous with the English word "robot" (servant). The root of this word may be traced to the Czech play *Rossum's Universal Roboters* of the 1920s in which human workers were portrayed as "robots" (*robota* in Czechoslovakian means servitude). In this context it may be mentioned that an understanding of God's purpose of creation of man and the universe is very much necessary to comprehend the overall mission of God. This aspect has been discussed in detail elsewhere [2]. Robot is a programmed dedicated machine designed to perform certain desired tasks. It is essentially a computer with three additional features namely, sensors (which receives data from the environment), microprocessors (which transform data into information) and actuators (or muscles, which control the energy requirement). An animal biorobot with sensory organs and brain (the location of CPU) is comparable with man-made robot but God's human robot is far beyond that level of sophistication. Man is bestowed with an additional processor, *qalb* (mind), which is capable of conscious perception of the world and has the freedom to take decision and act. Several functions of human *qalb* are identified in the Quran.

All of them are cases of conscious perception. The *qalb* is the part that thinks (i.e., processing information) and learns (Q. 22:46), and understands (Q. 7:179). The Quran further reveals that the faculties of hearing, seeing, understanding and feeling are made only for human species. "Say: It is He (Allah) who created you and made for you the faculties of hearing, seeing, feeling and understanding; little thanks it is you give." (Q. 67:23). These faculties are associated with the *qalb* (human mind), which is responsible for the conscious perception of the world. The Quran also reveals that these faculties are absent in animals although they have eyes and ears (Q. 7:179; 25:44). Clearly animals are totally programmed unconscious biorobots like man-made robots.

The role of mind comes in the execution of the conscious activities; that is, activity decided and/or executed by the mind is a conscious activity. Similarly any signal received through input ports (**Figure 3**) and processed by mind results in conscious perception. Consider the visual perception. Eye is the input port for electromagnetic radiation. It receives the radiation signal from outside, does the preliminary processing and then transmits it to the brain location concerned to decode its information content. The human mind decodes it in accordance with the biosoftware and creates its translated version. For example, let us say we are looking at a red object. This means that the object in reality is emitting or reflecting electromagnetic radiation in the 650-700 nm wavelength range. This radiation enters our eyes and its information is deciphered by our mind in accordance with our biosoftware to perceive it as red. In other words the object has no colour; the colour of the object is generated inside our brain. If our biosoftware stipulates blue colour for that wavelength range, we would have seen that object as blue.

Our biosoftware also prescribes limits to our perceptional potentials. For example, our visual perception is restricted to within 400-700 nm wavelength range. Therefore we cannot see X-rays and gamma rays because their wavelengths are outside of the limits set by our biosoftware in spite of the fact they also belong to the same form of energy, electromagnetic radiation. Our auditory perception is within the sound wave frequency range of about 12-20000 Hz outside of which we cannot hear and so on. It also assigns thresholds and maxima for each kind of sensory perception. For example, for a sound wave to become audible to us it should have a minimum intensity. There is also a maximum level beyond which our perception of sound will not be enhanced. In other words, human mind is unable to create tangible image to any signal that falls outside of the limits prescribed by the biosoftware. This implies two things; one is that the world around us is inherently soundless, colourless, shapeless and tasteless. It is the human mind that creates these characteristics based on the biosoftware and

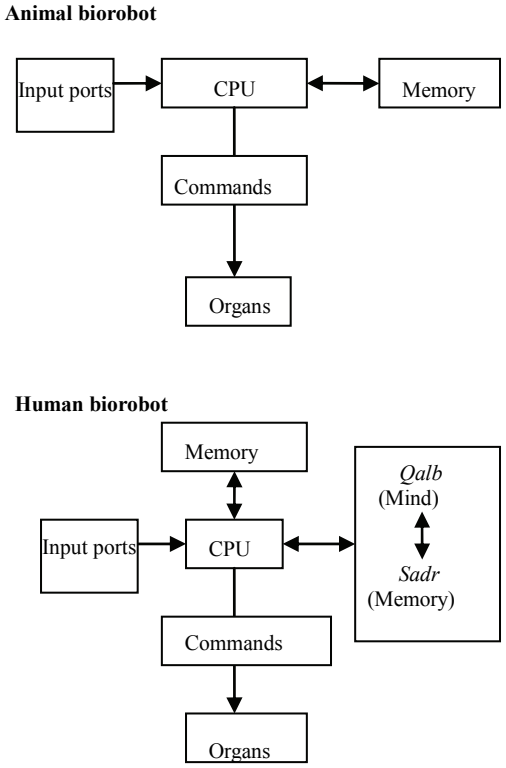

Figure 3. Contrast between animal and human biorobot systems.

imparts them to the outside world; and the other is that it is our biosoftware that determines what to perceive and how to perceive. Obviously, many forms of energy remain unperceived by us. This is the realm of the unknown (intangible), which the Quran describes as "*ghayb*" (in the computer jargon, virtual). The realm of the known or that perceived (tangible) by man is referred to in the Quran as "*shahadat*". God alone has the knowledge of both the intangible and the manifest (Q. 59:22). The dichotomy of *ghayb* and *shahadat* is relevant only in the human context. The fact that conscious perception of the world is determined by human biosoftware and that energy (information) does exist outside of the domain of human perception indicates the existence of the intangible.

As in animal biorobot, the CPU of human system is responsible for the house-keeping activities, i.e., internal biological activities that sustain the system. In addition to mind, human robot also has *sadr* (memory), where the conscious activities are recorded and stored. Cerebellum is thought to be a likely location of *sadr* in the light of certain Quranic verses [2]. The information stored in *sadr* in fact forms the dossier of conscious activities (including the acquired data and information) carried out by mind during the life of a person (for evaluation by God in the hereafter). The mechanism of storage could be iden-

tical to that of biosoftware storage on the chromosome.

Characterisation of biological information as non-particulate biomemes is opposed to the current particulate concept of biological information. Biologists do not distinguish biological information from chemical information but believe the DNA molecule (the gene) encodes biological information also. That is, the genome (the totality of the genes) structure besides having its physical and chemical properties also encodes the biological program of the organism. In effect, molecular biologists are superimposing biological information over chemical information literally making the molecule an entangled web of contrasting information. The computer model of the organism adopts Wilhelm Johannsen's non-physical gene concept. This concept agrees well with the Quranic and the Biblical revelation of intangible biosoftware. The computer model permits us to define the phenomena of life and death while in biology (the science of life), which is based on the particulate gene, it has not been possible to define these phenomena.

While proposing the concept of gene in 1909, Wilhelm Johannsen cautioned against two things. One was against considering the gene for a particular character, which implied that the genetic program should be viewed as an integrated program, and the other was against treating the gene as particulate [12]. Both these warnings have since proved correct. Today in the era of genomics, biologists are unable to define what the gene is and attribute genes for different characters. [13]. Particulate gene had never been the idea of early geneticists. The scientific community was, however, not comfortable with a hypothetical non-material entity having a "metaphysical" aura around it. Thus with the elucidation of the double helical structure of DNA and confirmation of its role in protein synthesis, the non-physical gene metamorphosed into physical gene. The molecular gene was born that way.

5. Natural Biosoftware Engineering Mechanisms

Natural biosoftware engineering mechanisms provide the tool to create diverse bimemomes. Since the biomemes are stored on the chromosome in sectors, qualitative and quantitative changes in bioinformation can be brought about by shifting, adding, deleting and shuffling the sectors. The role of transposable elements is crucial in many of these mechanisms. The bioinformation content of a cell as a whole can also be altered by increasing or decreasing the number of chromosomes. There are also mechanisms for multiplication of the cells as well as for eliminating the unwanted chromosomes or chromosome sectors. We find a variety of natural biosoftware engineering mechanisms in operation that can do all these and more. Some of these are: crossing over during meiosis (gamete formation), non-disjunction of sister chromatids during mitosis and meiosis leading to increase in chromosome number, the so-called chromosomal aberrations such as deletion, duplication inversion or insertion of chromosome sectors, etc. Although these phenomena are generally treated as errors or mistakes by biologists, they in fact form powerful molecular tools to produce radically different chromosome compositions and hence bioinformation content. All these processes viewed in the light of the computer concept are biosoftware-driven phenomena and not mistakes. It is these biosoftware engineering processes that produce biomemetic variability and hence phenotypic diversity in the offspring as programmed.

6. Developmental Biology

Another area where the computer concept of the organism throws light is developmental biology. It has not been possible to explain based on the molecular gene how anatomically and functionally different tissues develop. Until recently, it was thought that mitosis (a kind of cell division) taking place during development of an individual from zygote produces daughter cells with identical genomes. A recent finding that different tissues carry different genomes [14,15] called into question the current belief. The biomemetic concept adopted in the computer model however enables us to explain the phenomenon of ontogenetic development of an individual in conformity with this discovery [2]. Let us examine the development of a human individual from zygote based on the biomemetic concept

An important feature of the biomemome is that it produces a dynamic phenotype that is changing continuously from time zero (the time at which say a zygote starts developing) to its death. The biomemome is thus an integrated program deciding the phenome (phenotype) at every instant. The biomemome, in simple terms, is an integrated biological program of an individual. Development of an individual is just one phase in the continuous execution of the biomemome of the individual. Development of an individual presents the scenario of creating tissues (or group of cells) with different tasks assigned to them. This is achieved through mitotic cell division. Mitotic division is not mere copying or multiplication of cells as is believed now. Although the entire biomemome stored in the zygote (the biomemome of the individual) is copied into the daughter cells during mitosis, it can be assumed that the process also assigns to the resulting cells a set of biomemes to be in operation in each of them. In this way, differentiation of the operable biomemes progresses as dictated by the biomemome culminating in the formation of tissues. The set of operable biomemes in a given tissue may be designated as its "operamome". The hardware (including DNA) of the cells of a tissue is synthesized to suit the functions of the operamome. This is reflected in the differences in the cell structures among the tissues. For example, a muscle cell

is structurally and functionally different from a nerve cell, neuron. They both carry identical biomememomes but different operamomes. Thus, even though all the cells carry the biomememome of the individual, the operamome varies with tissue.

An example of visible manifestation of operamomic transistion in the phenotype is the metamorphosis of larva into butterfly. The biomememome of the organism creates the butterfly phenotype through a selective switching on and switching off of biomemes. As a result, different sets of biomemes (operamomes) come into operation creating a butterfly from a totally different phenotype, larva.

7. The Abiomeme-Biomeme Interactions

Phenotype is the product of biosoftware-environment interaction. Although the importance of environment in moulding the phenotype is recognized, the actual relationship between the two is not well understood. This can be explained convincingly through biomemetic approach. Not all the biomemes of an operamome in a tissue are in operation at any given instant as in the case of instructions carried in our computer program. Only those biomemes required at that instant are in operation. The others are silent. A latent biomeme comes into operation at the time stipulated in the program (e.g., development of sexual characters at puberty) or when the situation (e.g., environmental stress condition) warrants. Thus we can say the biomemes in operation in summer are not the same as those operate in winter. If a person spends some time in a hot place and then enters an air-conditioned room, the operamome will also change accordingly as specified in the biomememome. The environmental condition thus acts as switch for the right biomemes (if available) to come into play. When an insecticide is sprayed against a pest in a crop field, and if the pest has the biomemetic package that can resist its harmful effect, the chemical will act as stimulus to turn on those biomemes which in turn will confer protection to the organism against that chemical. The consequence of this memetic operation is "resistance development" in the pest against that chemical. Although the biomemetic package has been present in the organism all the while, it has not been in operation as the situation warranting its role has not arisen until then. Consequently, the cell may not be having the necessary hardware or it may have to modify some available hardware for execution of such rarely executed programs. Nevertheless when the situation arises for the biomemetic package to come into operation, it requires the right hardware for its execution. Therefore the cell synthesizes the necessary hardware (any structure including DNA) or modifies the existing hardware according to the program to make way for the execution of the newly turned-on memes. It is such events that in fact biologist refer to as "cell-induced mutagenesis". There are several reports relating to this phenomenon, which cannot be explained based on particulate gene concept but can be convincingly explained biomemetically. A couple of examples are given here.

Miroslav Radman, a molecular geneticist at the Universite Rene Descartes in Paris, discovered the phenomenon of cell-directed mutagenesis in 1970. He showed that bacteria harboured a genetic program to make mutations. At that time, no one believed this heretical proposal [16]. Many biologists were skeptical about this discovery because genetic mutation was considered as a random phenomenon. Although the discovery of a new group of DNA-synthesizing enzymes (polymerases) as the generator of mutations in times of stress [16] gave credence to Radman's finding, it was the work of Cairns *et al*. that galvanized the critics. In 1988 molecular biologist John Cairns and his colleagues at the Harvard School of Public Health reported induced mutations of various elements of the lac operon changes in *Escherichia coli* bacteria [17]. Their results showed that bacteria could induce specific mutations depending on their environmental conditions. But unfortunately these discoveries were sidelined. A recent report of resistance of bacteria to antibiotics also provides evidence of cell-induced mutation. Commenting on the work of Kohanski *et al.* [18], Martin Enserink writes: "Traditionally, the development of antibiotic resistance—a big and growing problem in medicine—has been seen as a passive phenomenon. Haphazard mutations occur in bacterial genomes, and bacteria randomly swap genetic elements. Every now and then, a mutation or a bit of newly acquired DNA enables the microbes to detoxify antibiotics, pump them out of the cells, or render them harmless in another way. When these microbes are exposed to antibiotics, natural selection will allow them to outcompete the ones that aren't resistant. But in the past 6 years, a different view has emerged, says microbiologist Jesús Blázquez of the Spanish National Research Council in Madrid. Researchers have discovered that mutation rates in bacteria sometimes go up in response to stress, in some cases promoting resistance. And studies by Blázquez and others have shown that the antibiotics themselves can cause this phenomenon, called hypermutability"[19].

Although against the particulate gene concept, the above reports are clear evidence of the existence of biological information in the cell itself to bring about necessary mutations at times of need. In the computer model of the organism, the changes in DNA are merely changes in the hardware like the change in any other cell structure. It is the biosoftware of the organism stored on the chromosomes, that brings about these changes or creates new structures (including DNA) so as to provide necessary hardware. In all these cases depending on the stimuli or signals received from the environment, specific bio-

memes are triggered into operation. Not all organisms will respond similarly to a given stress or environmental condition. An organism can react to an environmental condition only as directed by its biomemome. This would imply that all phenomic changes that occur in an organism are biomemome-directed phenomena *from within the cell* and *not externally induced* as is believed now. These may also be taken as instances of abioprogram-bioprogram interactions. The availability of biomemes to counter environmental stresses including the kind of resistance development is a natural evidence of God's designing the organism to meet the requirement in His scheme of things. These instances illustrate that heritable changes (mutations) that occur in an organism are biosoftware-induced and not by the action of any extraneous mutagen.

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