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Definitions of Life, Death, Genetic Program and Soul Based on the Quran and Computer Concept of the Universe

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Abstract

The phenomena of life and death have been defined and explained treating the biosystem (e.g., organism) as a natural computer system (NCS). A living organism has two components, the hardware and the software. The visible components comprising the chemical structures present in the cell (biochip), tissues and organs that make up the whole body collectively constitute the hardware. The genetic program, the invisible component, forms the software of the system. Genetic program is the secular equivalent of the soul or the '*ruh*' mentioned in the Quran. The phenomenon of life was therefore defined as the manifestation of the execution of the genetic program (soul) and death as the deletion of the software from the cell memory. Thus a dead body is comparable to a computer without software. The genetic program is supposed to have been stored in the cell perhaps by the same mechanism as brain stores data and information. The inadequacies of current thinking that genetic program is encoded in a chemical structure such as DNA (genome) have been discussed in this light.

Introduction

Although considerable research effort has gone into the understanding of DNA structure, designation of codon and characterization of genes and genomes of various species including man, the phenomenon called life still remains a mystery to human intellect. Although we search for life on other planets, life that is familiar to us on the earth has not been defined in science. To account for the characteristic properties of the

living and non-living systems and their components, and to explain their coordinated and integrated functioning with precise controls, a computer model of the universe was proposed for the first time by me in 1998.[1] This model was based on the Quranic indicators, natural evidence and scientific findings. Based on this model, the Quranic messages relating to the purpose of human creation, test of human beings on the earth, life and death, life-after, etc., were scientifically explained. It was also possible to define the phenomena of life, death and soul employing this concept in a scientific way in conjunction with the Quranic revelations. A tremendous boost for the computer concept of the universe occurred following the publication of a few research papers in 2002 in scientific journals supporting that view.[2,3] The research paper[2] published in *Physical Review Letters* by Professor Seth Lloyd of the Massachusetts Institute of Technology, Cambridge, USA, deserves special mention. Lloyd considers every process or every change that takes place in the universe as a kind of computation. If the universe is treated as a computer, it would have the computer power to do 10^{120} logical operations. Close on heels of the publication of Lloyd's paper, Stephen Wolfram[3] proposes in his book 'A New Kind of Science' published in 2002 by Wolfram Media Inc., USA, that 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.

The basic change that the computer concept of the universe brings in to our present knowledge of the universe and cosmology is that it is the patterns of information rather than matter and energy *per se* that represent the fundamental units of reality. Information theory says that every physical system from a glass of water to a microchip holds 1s and 0s in the states of its component particles. Changes in those states could be treated as "computation" just as our machine computes by changing the information in its memory. The connection between information science and physical processes appears once the events are considered on the quantum scale. According to Lloyd, the operations calculation from information theory and the bits calculation from quantum gravity yielded equivalent results suggesting that there is a connection out there between quantum gravity and computation. The universe's program could be thought of as the primordial quantum fluctuations that seed the formation of the galaxies.

Jurgen Schmidhuber of Dalle Molle Institute for Artificial Intelligence (IDSIA), Switzerland, proposes an algorithmic theory of everything. He 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". We are therefore living in a giant quantum computer. If that were the case, the material science comprising the traditional physics and chemistry, as well as biology will undergo a dramatic quantum revolution. The universe as a whole will be conceived as a digital phenomenon and the science of universe will be re-written in the form of algorithm in the divine language of natural computer constituting the *theory of everything*.

It is now well established that a genetic program exists in all living beings and it is responsible for the life processes and biological activities. In sexually reproducing organisms, for example, these activities include biological functions starting from the formation of a fertilized egg (the zygote) through development of a full-grown individual to death of the organism. All through the lifespan of the individual, the genetic program also takes care of the maintenance of the living system (repair of damages, resistance against diseases, etc.), stipulates its behavioural pattern, food habit, instincts, etc. Presently the genetic program is thought to have been coded in the chemical structure of DNA (genome) located in the chromosomes of the cell nucleus. According to Shapiro[4], genomes are organized like integrated computer programs as systems of routines and subroutines and not as a collection of independent genetic 'units'. A cellular DNA is a storage medium, like a hard disk containing coding information for the proteins and RNAs that the cell need to function. This coding information must be dynamically accessible for reading at the right time and in the right amounts as different molecular programs are executed. Successful retrieval of the information for multiple RNA and protein molecules requires physical organization of the genome with addresses for individual coding regions. This is achieved through the use of combinations of repeated sequences as address tags on related genetic loci. This paper attempts to examine the validity of the argument of genome – genetic program equivalence and to explain further the phenomena of life, death and soul in the light of recent advances in science and technology.

Inadequacy of the genetic program – genome equivalence concept

The contention that genome constitutes the genetic program implies that millions of instructions and their sequences which in fact form the genetic program, are the properties of a chemical structure. Although such a notion is nurtured to account for the biological activities, non-correspondence of genomic identity with genetic program is becoming increasingly evident from several investigations. Some of these are:

a) Studies at the molecular level fail to demonstrate the expected correspondence between changes in genome composition and the changes in the organism in accordance with the Darwinian notion of descent with modification from a common ancestor. Evolution by DNA mutation is largely uncoupled from morphological evolution[5]. The most spectacular example of this is the morphological dissimilarity of humans and chimpanzees despite over 98% similarity in their DNA[6,7]. The differences in traits, characteristic behaviour and capabilities between human (*Homo sapiens*) and chimpanzee (*Pan* sp.) are far greater than the small degree of sequence divergence (1.3%) could account for. A chimp is not 98% human being nor a human being is 98% chimp. This indicates that there is no linear genome-phenotype relationship. Evidently, genome does not constitute the genetic program. Further, the human gene count is only 35,000 that is much less than that of simple creatures like the lowly worm (*Caenorhabditis elegans*). With the advent of cloning, in which new progenies are produced by reprogramming the genome of somatic cells from an adult donor, the differences between genomes and individuals are becoming even more evident. Comparisons of genomes in different organisms had revealed unexpected patterns of evolutionary conservation across large taxonomic distances, while closely related genomes frequently differ significantly in the arrangement of repetitive DNA elements which do not encode proteins[8]. These revelations, a direct contribution of the recombinant technology, cast doubt on the very idea that genome is the chemical equivalent of genetic program.

b) We also find that a genome is capable of producing two or more different biological systems without the need for any mutation. Consider the insect world. We observe in the life cycle of an insect, stages or more correctly biosystems that are totally different and independent of each other. The larval and adult stages of a butterfly are two living systems which have nothing in common but are different in every respect, be it

anatomical, physiological or functional. They are self-sufficient and self-sustaining biosystems in their own right, produced from a single genome. The development of more than one morphologically, physiologically and functionally different systems from a single genome is tantamount to a chemical compound showing different properties under identical conditions at different points of time. As far as our knowledge in physics and chemistry goes, a chemical structure has specific properties in a given set of environmental conditions and these properties cannot change with time. Ageing process is another example of differential expression of the properties with time. Such temporal differences in properties cannot be attributed to a chemical structure. Qualitative and functional differences among various tissues of the body originated from the same genome through mitosis provide another proof against the contention that the genome forms the genetic program.

c) Many insects exhibit alternative morphologies (polyphenisms) based on differential gene expression rather than genetic polymorphism (differences in genes themselves). One of the best understood insect polyphenisms is the queen-worker dimorphism in honey bees. Both the queens and the workers are females but morphologically distinct forms. Besides, the queen is fertile whereas the worker is sterile. Studies conducted with *Apis mellifera* revealed that numerous genes appeared to be differentially expressed between the two castes[9]. The seven differentially expressed loci observed in the study belonged to at least five distinctly different functional groups. The queen and the worker castes in honey bee provide an unfailing proof of the natural existence of similar genomes exhibiting dissimilar phenotypes.

d) Unanimous acceptance of DNA's genetic monopoly becomes even more surprising, if we take into consideration that the first credible evidence of "non-nucleic acid" inheritance is almost as old as the double helix[10]. Organization of cortex, a multiprotein complex forming the outer surface of the celiate cell in *Paramecium* was shown to be a case of cytoplasmic inheritance[11]. A lot of evidence supporting the "structural inheritance" model has now accumulated in the literature (for a review, see Shapiro[8]). The idea that proteins are able to transmit information from one protein molecule to another protein molecule provides a new dimension to the non-DNA inheritance. This is amply reflected in the transmission of a prion disease called "mad cow disease" or bovine

spongiform encephalopathy (BSE) from cow to humans through the consumption of the meat of the infected animal. The oldest example of prion disease is scrapie disease in sheep. The BSE is apparently transmitted from sheep to cows. Both PrP^{Sc} (prion protein from scrapie) and PrP^{C} (cellular prion protein in humans) can be expressed from one and the same nucleotide sequence, even though they cause different phenotypes. While PrP^{C} conformation remains stable in the absence of PrP^{Sc}, it is converted into PrP^{Sc} once the PrP^{Sc} "template" is present, despite the fact that the sequence of nucleotides in the gene, as well as the sequence of amino acids in the protein, remains unchanged. DNA theory does not explain how two protein cells can be the same genetically, but act very differently when folded other than normal. Mad cow disease is an apparent violation of the traditional thinking. In the case of yeast prions, differences between alternative phenotypic traits are not determined by differences in DNA sequences. Both "prion containing" and "non-prion containing" cell may have one and the same sequence of nucleotides in DNA, nevertheless they exhibit alternative phenotypic traits that are inherited in cell generations[10]. It was also demonstrated that one and the same RNA sequence was able to fold into two different ribozymes with distinct enzymatic activities[12].

From the foregoing discussion, two possibilities can be identified; one is the existence of alternate source of genetic program other than genome (DNA) and the other is the existence of genetic program independently of any chemical structure. The experimental evidence clearly shows that the property of DNA is to synthesize proteins whose amino acid composition is decided by the codon, the triplet base sequence in DNA structure. This function alone is to be considered as the property of DNA. A gene (a piece of DNA strand in the genome) thus shows its chemical property as any other chemical structure in the cell does. What constitute a genetic program are the commands and instructions, their sequences and their timings for developmental and post-developmental phases of the organism as well as information such as instincts, etc. These instructions and information cannot be explained in terms of the properties of any chemical structure not only because of the discrepancies and anomalies of the kind mentioned above but because of other reasons as well. All efforts so far made to produce life from chemically synthesized structures such as DNA and from dead cells (through culture) have been

unsuccessful. If a chemical structure encodes the genetic program, it would have been possible to produce life from it. A virus has either DNA or RNA but yet it is not a free-living organism. Growth and multiplication of the virus particle can occur only if it gets hooked on to a living cell's DNA. Further, certain mutations are repaired in the cell. Is it possible to explain that a chemical structure (DNA) is *aware of* the change in its composition and it reverts itself to the original structure?

The underlying assumption that a genetic program encoded in a chemical structure (genome) directs embryonic development has been seriously questioned by developmental biologists[13]. Goodwin[14] noted that genes were responsible for determining which molecules an organism can produce but the molecular composition of an organism does not in general determine their form. In a critique of the notion of genetic program, it was concluded that the only strictly correct view of the function of genes is that they supply cells, and ultimately organisms, with chemical materials[15]. Notwithstanding any of the reasons discussed above, the most obvious and undeniable proof against the genome-genetic program equivalence is the loss of life property at the time of death. A chemical structure cannot lose its property at a particular point of time. If life properties are derived from the chemical structure of genome, death of an organism would be tantamount to the loss of property of that chemical structure. Such a contention is scientifically untenable.

Life and death

The difficulty associated with understanding and defining the phenomena of life and death is due to the erroneous linking of the genetic program with a chemical structure. This problem was effectively and logically solved by treating the genetic program as an entity independent of the genome structure and explaining them in the light of the Quranic revelations on '*ruh*'[1]. Consider a biological system (e.g., an organism) as a natural computer system (NCS). The genetic program of the organism would then constitute its software. In computer parlance the genetic program may be defined as sets of instructions in the right sequence for the execution of various bioprocesses, behaviour, instincts and every other task performed by the NCS from the start of its development to its death. The physical body comprising every chemical structure from the individual organelles at the cellular level to parts and organs at the

level of the organism constitutes the hardware of the NCS.

The contention that genetic program exists independently of any chemical structure leads to the inevitable question as to how then it exists in the cell? Probably genetic program exists as stored information in the storage device(s) of the cell. The concept is akin to the mechanism of program and information storage in our machines. When a program or data is stored in a computer, it does not form an integral part of the chemical structure of the storage device. The natural evidence of such a mechanism for storage can be found in the example of brain memory. Human brain stores data and information without affecting any chemical structure including genome. The genetic program (the unseen component or the software) of a biosystem would also have been stored in the cell by similar or by the same mechanism as brain stores information. The term gene is to be redefined in this context to mean a 'program bit' rather than a segment of DNA structure. It is a bio-term applicable only to living systems. A living cell may be correspondingly considered as a biochip. It has a memory where the genetic program and other information are stored. The chromosomes (and probably other structures as well) may be serving as the biomemory. The biomemory may be existing in a sectored fashion as in a computer disk; with the genetic program stored as Read-Only-Memory. Going by this argument, all the chemical structures including genome are produced in the cell based on the genetic program for its execution.

The proposed concept also enables us to explain the phenotypic changes that occur as a result of genetic mutation. Presently, a change in the DNA structure or in its sequence is considered a mutation, i.e., a change in genetic program. In the proposed concept, such a change would constitute only a change in the hardware component and not in the software. The resulting phenotypic change is due to the change in hardware and can be explained as follows. Consider a triplet code (codon) as forming a typeface of an electronic typewriter. Take the case of particular triplet which in the typewriter example forms the character X. When a command comes, it would print the character, say X. Now if the character changes (i.e., base sequence in the gene through mutation) to Y, the command remaining the same, it would print now the character Y. This analogy can be taken to explain the change in amino acid sequence occurring in protein synthesis due to a change in DNA base sequence (which creates a corresponding change in mRNA).

Alteration of characters through recombinant DNA technology as in gene transfer and creation of transgenic organisms, etc., are all examples of mutations effected at the hardware (chemical structure) level. If substantial change occurs in the genome (hardware component), it will not be possible for the system to execute the genetic program. This would explain why macromutations are lethal.

Genetic program – soul equivalence

The human genome (treating it as genetic program) has been labeled the "Book of Man".[16] According to our present belief in science, the genome sequence is what dictates our humanness, the blueprint of human nature at the individual and species levels. In an excellent article "Essays on Science and Society: Is the genome the secular equivalent of the soul?" Alex Mauron of Bioethics Research and Teaching Unit, University of Geneva, compared the concept of genome with the metaphysical idea of soul.[17] The human soul was viewed as encapsulating the human essence. He also cited an earlier thinking in this line by Max Delbruck, a twentieth century pioneer of molecular biology, who noted how the notion of a genetic program (borrowed by molecular biologists from the fledgling computer sciences) had an uncanny kinship with Aristotelian concept of eidos, the organizing principle inherent in every living thing. Aristotle and medieval philosophers such as Thomas Aquinas regarded the concept of eidos as closely connected with the notion of a forma or 'soul' which was believed to shape matter into the recognizable form of a living organism. Forma was seen as imbuing an organism with individual characteristics as well as the essence of that species. Thus plants were viewed as having a vegetative soul, animals a sensitive soul, and humans an intellectual soul. This concept of forma still operates in contemporary bioethical debates about when a human embryo achieves personhood.

The Quran describes the process of creation of man as follows. Man was created from clay (the term 'dust' was also used)[18,19] and God breathed into him His *ruh*[20,21]. The 'breath of life' or the word '*ruh*' mentioned in the Quran indicate the software that is synonymous with the more commonly used term 'soul'.[1] Another Arabic term '*nafs*' used in the Quran would indicate either human individual (i.e., the biological system with soul) or the soul alone depending on the context[22,23]. The problem faced in science in defining life and death was effectively solved by explaining these phenomena in the light

of these holy messages.[1] Considering 'soul' or '*ruh*' (the unseen component of a living system) as the spiritual equivalent of the genetic program (the software), the phenomenon of life can be defined as the manifestation of the execution of the soul (genetic program). "Watson and Crick must have thought that the sequence was everything" reflects Peter Cook, who studies the structure and function of the cell nucleus at the University of Oxford, U.K. "But life is much more complicated than that"[24].

The holy Quran informs us that at the time of death, the soul (software) of the individual is removed[23]. Death can be therefore defined as the removal of the soul (the software) from the body. In effect, the genetic program is 'deleted' from the cell memory through a command for executing that function. Natural mechanism does exist in deleting information from the body. Irreversible loss of memory is a kind of natural 'deletion' that occurs in human beings, whereby an individual loses information stored in the brain. Perhaps the deletion function is implemented through a similar mechanism. A dead body is thus comparable to a computer without software. The system has been deprived of its software and hence in spite of the existence of all the hardware components (including genome), the body is incapable of sustaining its life functions. The testability of this argument lies in at least two predictions: a) life will never be produced in the laboratory from pure chemicals or from dead matter; it can only be copied from a living thing to another, b) the phenomenon of death will remain unexplained so long as a chemical structure (e.g., DNA) is considered as the genetic program.

Foot notes (References)

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