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Soul Intelligence, Biological Processes and Biological Structures – An Epistemological Study

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Faculties of Soul in Jainism

Many biological processes in organisms are said to take place intelligently. Modern biology now admits that living organisms are dynamically complex functional entities not reducible to simple mechanical-chemical descriptions. Barbara McClintock [1] showed that organisms can engineer their DNA. Shapiro [2] claims that the whole organism engineers the modification of its genetic structure in response to stress or to achieve a goal. He concludes that cognitive intelligence is necessary to properly explain the behavior of cellular and genetic processes. It can, therefore, be deduced philosophically from the Science of Logic that cognition, consciousness or sentience is the immediate existential Concept of life and intelligence is a necessary feature of organisms. Jainism distinguishes between the body of a living organism, called *sachit*, and the body of a dead organism, called *achit*, meaning thereby that the *sachit* body has consciousness or intelligence like features.

It is generally accepted by many scientists that matter, the constituent of the body, does not possess intelligence. The question then is what is the source of intelligence in the body of an organism? Jainism propounds that intelligence is the property of soul (non-physical) and not the matter. The basic question how the intelligence of soul is transferred to matter, the body, was considered by Kachhara [3]. He presented a possible model in which the intelligence of soul is instituted in karma which then becomes an intelligent force and an agent for accomplishing the psychical, biological and physiological processes in the body intelligently. He also proposed the concept of soul faculties that facilitates study of the empirical soul scientifically.

Soul in Jainism is non-physical substance having two important properties consciousness and *upayoga*, manifestation of consciousness particularly in respect of cognition activity. Intelligence and awareness are two important manifestations of the soul consciousness. The intelligent physical force expressed by karma radiations is defined as faculty of the soul. We must note that the intelligence and subjectivity of the soul is accounted for in defining the faculties. The faculties are divided in two groups.

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1 Psychical or external faculties (Intelligence). These faculties concern with the psychical performance of the soul. They include the faculty of knowing, faculty of awareness, faculty of equanimity, volition and desire, and the faculty of attitude. These faculties are expressed externally and can be measured if suitable ways can be devised. They operate through mind, which has a large bearing on their functioning. When the psychical karmas are annihilated these faculties cease to exist and the corresponding qualities of the soul manifest in their true form.

2 Biological or internal faculties (Intelligence). These faculties concern with the biological and physiological functions of the empirical soul. They include the faculty of feeling, faculty of life force, faculty of designing and creation, and the faculty of quality. These faculties are internal and we are not consciously aware of them. They work on voluntary basis and are not accessible to conscious mind, which is product of psychical faculties. These faculties remain in existence even after the psychical karmas are eliminated. They cease to exist on liberation.

The concept of psychical faculties can help in the study of psychology of human beings. The internal biological faculties help in explaining the biological and physiological processes taking place in organisms. The performance and behavior of the soul is guided by both the psychical and biological faculties. The function of the psychical faculties, which generally operate through the conscious mind, in determining our performance is known and clear. The activities of cognition, perception, feeling and willing, thinking and imagining, etc. is all guided by the psychical faculties. The biological faculties though primarily concern with the biological functions also influence our behavior and performance.

Environment and Epigenetics

Scientists now recognize that both genes and the environment influence behavior [4]. Genes, via their influences on morphology and physiology, create a framework with which the environment acts to shape the behavior of an individual animal. The environment can affect the morphological and physiological development; in turn behavior develops as a result of that animal's shape and internal working. Genes also create the scaffold for learning, memory, and cognition, mechanism that allow animals to acquire and store information about their environment for use in shaping their behavior. Much behavioral genetic research today focuses on identifying genes that affect behavioral dimensions, such as personality and intelligence, and disorders, such as autism, hyperactivity, depression, and schizophrenia.

Epigenetics is another emerging field in the study of behavior [5]. It is about stability heritable phenotype resulting from changes in a chromosome without alterations in the DNA sequence. Epigenetic changes can modify the activation of certain genes, but not the sequences of DNA. Additionally, the chromatin proteins around which DNA is wrapped may be activated or

silenced. This is why the differentiated cells in a multi-cellular organism express only the genes that are necessary for their own activity. Epigenetic changes are preserved when cells divide.

The activation of genes is caused by signals coming from some source. There are two possible sources the biological faculties and the environment. The karma radiations are internal sources sending signals directly to cells for changes in the DNA protein that is supposed to regulate the selective functioning of DNA. The environment is the external source which acts through senses and mind and the signals are generated in the brain for actions on cells. Scientists are aware of the environmental source but are unaware of the biological faculty source, which besides the psychical faculties may be the main force behind our behavior.

Behavioral epigenetics is the field of study examining the role of epigenetics in shaping animal and human behavior [6]. The epigenetic changes can influence the growth of neurons in the developing brain as well as modify activity of the neurons in the adult brain. Together, these epigenetic changes in neuron structure and function can have a marked influence on an organism's behavior.

Life System

The worldly or empirical soul is impure, it is associated with karma. Karma has two counterparts, *dravya* karma and *bhava* karma. The *dravya* karma is comprised of *karman vargana* which is supposed to be subtle matter, in the form of an energy field. The *bhava* karma is impurity of the soul, which is some mode of the soul itself, and determines its state in worldly existence. It is supposed that the two counterparts of karma are always in equilibrium, that is, a change in one part is reflected as corresponding change in the other part instantaneously. This is the principle of interaction between the soul and karma. A change in the state of the soul appears as a change in the state of karma and vice versa.

In its empirical existence the soul possesses three bodies, the karma body as described above, the *tejas* body, an electric type of body, and the gross material body. The non-physical soul occupies the space of the physical body and is the causal part of the system in the sense that it is because of the soul that other bodies exist. Being non-physical the soul has no physical contact with other bodies but still it is linked to all bodies so that together they constitute a system. The linkages between the various components of the system are shown in figure 1. The *bhava* karma of the soul and the karma body (*dravya* karma) in the subtle body are linked by the principle of parallelism described above. The karma body is linked to gross body through radiations known as *adhyavasaya* and *lesya*. In this system of three basic units, empirical soul, karma body (and *tejas* body), and the gross body, a change in any one affects the other units and the whole system. The soul and the matter, of gross body and karma body, possess individual particular properties which are important parameters for their change but they are

also affected by changes in other units of the system. Therefore, in order to study performance of any one unit it is necessary to know the changes taking place in and the performance of other units. They are interdependent and cannot be studied in isolation. Their interrelations and interactions are important without which the study is incomplete. This is the reason that biological studies of organisms by scientists need to assume existence of intelligence to explain phenomena and processes in the body. In order to understand the performance of the gross body it is necessary to know about the soul and the karma processes. Similarly, to know about the transformations in the soul it is necessary to understand the biological processes and the actions of karma.

The sequence of activities in the operation of life system is shown in figure 1. Yoga, activity of mind, speech and body (senses), causes bonding of *dravya* karma at state K1. This action is reflected in *bhava* karma of the soul. The soul responds intelligently based on its constituent structure, including *kashaya*, and environmental inputs, and changes its state from S1 to S2. This change in *bhava* karma changes the state of *dravya* karma to K2 and the concerned faculty forces direct the activity 2 in the body which at the same time also is determined by

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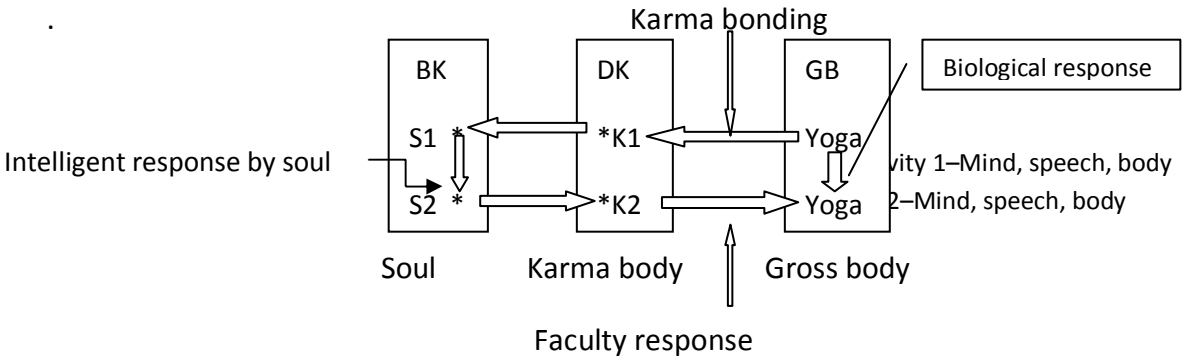

Figure 1 Operation of Life System

biological response of the gross body. So there are two determinants of activity 2, one, the biological response based on physical principles to activity 1, and, two, the directives of the soul through faculty forces. The resulting activity 2 is therefore is a complex subjective phenomena and may not be predicted by known rules of physical science. The process proceeds at a fast rate, almost instantaneously, and we experience the activities in a continuous manner. If the response of the soul and the biological response are similar the activity 2 may appear as a logical scientific outcome of activity 1. But if the soul response is not same as the biological response the activity 2 may be different from what is expected according to physical science.

Thus the effect of subjectivity of the soul may not always be discernable although it always exists. The system performance is determined by two kinds of responses the physical, matter, and sentient, spiritual. In case of match, order may be maintained in the system and a mismatch may produce a disorder.

Some Intelligent Biological Processes

All the four kinds of internal faculties are at work in organizing and coordinating the biological and physiological processes in organisms. The physical part of system of organism can be assumed to consist of two major constituents matter and faculties, and their interactions. Science has studied the matter part but it is still short of offering explanations of many of the phenomena which are supposed to take place intelligently in the body. We quote here some examples for the purpose of illustration and see how introduction of the concept of faculty helps in finding possible explanations of such intelligent biological processes.

There are examples when biologists have found the physical forces inadequate to explain the physiological processes and have speculated presence of some hidden intelligent force that seem to work to produce the biological structures. Some scientific findings corroborate the fact of existence of karma like forces to explain the processes taking place in cells

Scientists have been in search for the rules of ordered form of morphological structures like organs. This gave birth to the idea of morphogenetic field in 1920s. This field was defined as a collection of cells able to respond to discrete, localized biochemical signals leading to the development of specific morphological structures or organs. The fields had a definite boundary and the organ formed only from the interactions of cells within the field. The cells within this field could regulate.

Rupert Sheldrake [7] proposes that there is a field within and around a morphic unit which organizes its characteristics structure and patterns of activity. He says that we know what DNA does: it codes for the sequence of amino acids which form proteins. However, there is a big difference between coding for the structure of a protein and programming the development of an entire organism. It is the difference between making bricks and building a house out of the bricks. You need the bricks to build the house. If you have defective bricks, the house will be defective. But the plan of the house is not contained in the bricks, or the wires, or the beams, or cement. Analogously, DNA only codes for the materials from which the body is constructed: the enzymes, the structural proteins, and so forth. There is no evidence that it also codes for the plan, the cells of the body. DNA alone cannot explain the difference in form; something else is necessary to explain it.

Sheldrake is of the view that heredity depends not only on DNA, which enables organisms to build right chemical building blocks - the proteins, but also on morphic resonance. Heredity thus has two aspects: one a genetic heredity, which accounts for the inheritance of proteins through DNA's control of protein synthesis; the second a form of heredity based on morphic fields (implying *gotra* karma or faculty of quality) and morphic resonance, which is non genetic and which is inherited directly from past members of the species. This latter form of heredity deals with the organization of form and behaviour.

The idea of morphogenetic field is clearly seen to be similar to *naam* karma of Jaina. The *naam* karmas contain the plan of form of all organisms as against the plan for just one species as believed by scientists in the theory of morphogenetic fields. The idea of fields within fields for a particular species for formation of organs starting from a cell is acceptable to Jaina as evinced by various types of *naam* karma. The scope of *naam* karma covers all the realms of existences, viz. animals, human beings, infernal beings and heavenly beings, and all species or organisms. The idea of cosmic morphic fields containing information about plans of forms as proposed by Rupert Sheldrake is not acceptable to Jaina. Jaina holds that the plans are contained in the *naam* karma carried by each individual organism. In the scheme of *naam* karma there is no need for concept like morphic fields of Sheldrake, to derive the plans of forms of organisms from a source outside the body.

Assuming that *naam* karmas contain plans of forms of all organisms how the body of an organism of a particular species is formed? The selection of plan is perhaps made by *ayusya* karma or the faculty of life force. It means that from a general pool of morphological plans carried by the organism the *ayusya* karma accesses the particular plan needed to form the structure of that particular species to which the organism now belongs. The *ayusya* karma is bonded for next one birth only, that is the *ayusya* karma we bond in this life decides the form in the next birth and not thereafter. The *ayusya* karma has one-life use giving freedom to *jiva* to have the form of a different species in each birth. So the system of general morphological plans works successfully and the plan for particular species as per *ayusya* karma bound is applied by the *jiva* in any given birth.

There is vast difference between house making and body formation. For building a house we need many kinds of materials e.g. bricks, cement, mortar, steel, timber, pipes, wires, cables etc. and these are made by different agencies. In the formation of body the only material required from outside is food and water and all the other components required are made in the body in vivo. The body itself makes the components like flesh, blood, bones, fluids, etc. at the right place, in right size and shape, at the right time and in the right way out of the elements contained in the food and water so efficiently and precisely that it can only be called marvel from the standard of present scientific knowledge. Can this happen without

intelligence? Certainly, it is the intelligence of the biological faculties that makes this extraordinary feat possible. It is not possible with the present day science to accomplish similar task outside the body.

In another example we consider an important scientific discovery of bio photons. It is now well established that all living systems emit a weak light current of some photons. Scientists found that the nature of this weak light emitted by living cells is different from the sunlight. They called these light photons as bio-photons.

The pioneering work done by Fritz – Albert Popp [8, 9] has given a deep insight into the phenomenon of bio photon emission. According to him the purely molecular aspect of life sciences may be only one necessary step in understanding biology and can never reach the significance of sufficient and complete explanation. Molecules have no intelligence, despite the manifold impressive functions that have been assigned to them. Even the enzymes or messenger molecules have to be triggered by external energy, i.e. photons which activate the diversion transition state complexes. The non-thermal photons provide the right quantum energies at the right place and right time for the millions of reactions per second per cell. Thus, one has to stress that (1) it is impossible that thermal photons may trigger the biochemical reactions in living systems, and (2) that theoretically only one photon per cell could be sufficient for activating 10^9 reactions per second, provided that it originates from a coherent photon field. If this field is coherent and non-thermal one, it is theoretically able to borrow the photon energy at the right time and take it to the right position of the reaction and to reabsorb it immediately after this event which, in general, takes no longer than about 10^{-9} seconds.

Popp found that a living organism in fact possesses a living aura, a virtual electromagnetic field that pervades the entire organism with a virtual photonic flux. In this field, virtual photons are stored. The field continually receives inputs (virtual) from the environment and is continually outputting bio photons, particularly in the near ultraviolet. This field, in which all cells are bathed and with which they all continually intercommunicate, tends to stabilize and cohere the organism. All this has been established by laboratory experiments.

The bio photon emission is indicative of an endogenous, innate, electromagnetic field pervading the entire organism, which may act as both sender and receiver of the bio photon that are "electromagnetic bio – information" used in regulating life processes. These observations, among others, suggest control within the living state and possibly electromagnetic in nature. From the bio physical point of view bio photons are regulating the body in its rather complex functions. The bio photons appear to have many features common to *adhyavasaya.* There is a great similarity between *adhyvasaya* and bio photons [10]. It is now

easy to understand what the source of intelligence in bio photons is. The intelligence comes from the soul through *naam* karma or the faculty of design and creation.

The genes carry all the instructions for making proteins. Only a part of the total instructions are used at any particular location of the body and a cell suitable to that location is made by the genes. Who makes this selection of the set of instructions to be followed? According to Jaina doctrine such decisions must be assigned to the faculty of design and creation. The DNA in every cell is identical but each cell performs differently and produces a variety of proteins in different parts of the body. This kind of selective function of DNA is possible due to karma. There is laboratory evidence that DNA is influenced and reprogrammed by radio and light frequencies [11]. The karma radiations in each gene are identical but they work selectively, they must regulate the non-protein making part of genes through a process of selection, and determine different function of cells suitable to their locations in the body. In this manner the performance of the body at the cell level must be regulated by the soul intelligence through faculty of design and creation.

Guenter Albrecht-Buehler [12] claims that 30 years of his research on cell has shown that mammalian cells possess intelligence. An intelligent cell contains a compartment, which is capable of collecting and integrating a variety of physically different and unforeseeable signals as the basis of problem solving decisions. G.de Purucker [13] wrote many years ago about life atoms, centrosomes, and centrioles. He stated that "In each cell there is a central *pranic* nucleus which is the life-germ of a life-atom, and all the rest of the cell is merely the carpentry of the cell built around it by the forces flowing forth from the heart of this life-atom." A life-atom is a consciousness-point. The intelligence, according to Jain philosophy, means presence of faculty forces in the cell. The faculties exercise control on the working of the genes and the cell functions. There is a central authority (the soul) that monitors, coordinates and controls the activities of individual cells as well as of a group of cells like tissue or organ or part, so that each cell, group of cells and organs perform according to plan contained in the karma body. It is obvious that the intelligence of soul manifested through faculties constructs the body according to the blue print contained in the karma body.

The above examples of intelligent biological processes do establish the proposition that the constituents of the physical body, though 'skilled', are slaves of the intelligent master, the soul. This leads to some important inferences. (1) The slaves, assuming that they are being directed, have their individual existence. This means that the body components and constituents can also be manipulated to some extent independent of the soul. This in fact is the approach of medical science. (2) The soul responds intelligently to these changes in the body, including gene manipulations. The changes may or may not be accepted to the soul. (3) The response of the (life) system to the changes in the body cannot be predicted because of the

subjective response from the soul. The success of scientific experiments on the body, particularly pertaining to the fundamental changes in its structure, is therefore uncertain. These inferences have important implications on bio-medical science and research.

Cognitive biology [14] examines the biological structures for their epistemological functions. It has grown out of molecular biology, with an assumption that elucidation of molecular recognition, of processing of molecular signals, of the organization of gene network, of protein computations may provide a clue for understanding higher cognitive processes. The knowledge is supposed to be embodied in constructions of organisms, and their structural complexity. Cognitive biology considers biological evolution as a progressive process of accumulation of knowledge.

Following the work of Barbara McClintok, Shapiro concludes that cognitive intelligence is necessary to properly explain the behavior of cellular and genomic processes. Now that it is being recognized that cellular processes are cognitive, it can be deduced philosophically from the *Science of Logic* that cognition, consciousness or sentience is the immediate existential concept of life. This confirms that intelligence is a necessary feature of organisms and points out to the role of a subject, which is well defined concept in Jain philosophy. According to Jain philosophy biological faculties have an important role in the formation of biological structures. The complexity of these structures depends on the manifested intelligence of the soul, but the structures themselves are not the source of intelligence. Intelligence and consciousness in no way can be reduced to materialistic properties. The subjective role of consciousness is likely to be a defining feature of new biology.

Cognitions and Knowledge

Cognition is activity of the soul to know and the output of this activity is knowledge. Cognition in Jainism is of two types indirect and direct [15].

Indirect cognitions

1. **Perceptual Cognition (or Empirical Knowledge) (*Mati jnana*)**.

The perceptual cognition is the knowledge due to sense - organs and the mind. The knowledge is conceptual consciousness and is determinate. The mind establishes contact with the external world through senses. The sense signals are communicated to brain and then contacts are made with mind. If the connection between sense organs and brain is broken due

to some reason the mind does not know the object. The thinking process starts when the object is perceived by the mind.

2. Articulate knowledge (*Sruti jnana*)

The cognition made by the soul by means of material symbols like words, gesture etc. is called articulate knowledge. It has *mati* as its cause. Really, it is *mati* with prolonged activity. *Sruti jnana* like *mati* is also produced by senses and the mind. Both the empirical knowledge and articulate knowledge refer to the states of the soul transformed by removal cum subsidence of the respective obstructing karmas. Corresponding to such transformations there are processes taking place in the physical body and here they refer to activities of the senses and mind, which are instrumental in production of knowledge. *Mati* and *sruti* are very much interdependent and it is difficult to separate them.

Articulate knowledge is also defined as application of empirical knowledge. For instance one learns that fire burns the hand when he places his hand close to fire. This is empirical knowledge that shows the burning quality of fire. Based on this knowledge the measures taken by him to prevent burning and using fire for cooking and other purposes is articulate knowledge. The same knowledge of burning quality of fire is articulate knowledge for the other individual learning this without experimenting himself. So it is difficult to draw a line between articulate knowledge and empirical knowledge. All beings possess both empirical and articulate knowledge.

Direct Cognitions

Besides the above two types of cognitions involving mind there are other three types of direct cognitions described in Jain philosophy. Direct cognitions arise from the soul without any external help. It apprehends the objects that are remote, past, future, minute, hidden or otherwise non-cognizable through the senses. It is supernormal. It gets its manifestation according to the partial or total removal of the corresponding obscurance.

(1) *Avadhi jnana* (Clairvoyance). *Avadhi jnana* is the supernormal cognition of material objects. It resembles clairvoyance and clair-audience of modern psychology.

(2) *Manahaparyaya jnana* (Mind-reading)

(3) *Keval jnana* (Omniscience). *Keval jnana* is attained when the obscuring karmic veil (*ghatin*) is totally removed. It knows all the objects in their entirety with all qualities and modes. It is the stage of omniscience, the perfect knowledge.

The cognitions of a normal human being are generally indirect, direct cognitions take place in only a few individuals placed in higher spiritual state. All scientific studies, inventions and discoveries are supposed to be the result of indirect cognition.

Biological Structures

Biological structures are physical structures, composed of organic compounds that form constituent support systems for life. The simplest types of structures are amino acids which form the polymeric building blocks of modern life. Advances in biology and medical sciences have made it possible to create artificial biological structures like cell, tissue, meat, organs and clones. Some scholars see this as a challenge to the doctrine of karma and hence to the existence of the soul. This is not correct. All these advancements have in fact been made by the power of the human mind which is embodiment of soul intelligence. The intelligence of the soul is ingeniously used to manipulate the organizing capacity of *pudgala* (matter) to create useful artificial biological structures which otherwise are created naturally by the faculties of the soul in development of bodies of the organisms. These structures, artificial or natural, are the consequences of intelligence of the soul and should not raise any doubt on the existence of the soul and doctrine of karma. The quality of the structures however is dependent on the efficiency of utilization of soul intelligence which is very high in the natural processes.

Based on the method of application of intelligence we can classify the biological structures in three categories.

1 Simple structure formed without human intelligence.

The amino acids formed spontaneously in the environment under appropriate conditions, as shown by Miller – Urey experiments [16], are structures formed without application of human intelligence. These are said to be essential conditions for development of life. These chemical compounds are the result of organizing capacity possessed by material molecules under specific conditions. This kind of organization of molecules is not termed as intelligent act as this does not require human intervention.

2 Biological structures obtained with the application of human mind.

All our mental acts are the consequences of application of psychical faculty. Human mind is the carrier of psychical intelligence and it can be employed in various ways to produce complicated biological structures from simple structures. These structures are of four kinds.

(a) Structures such as nucleic acids and proteins synthesized in laboratory starting from simple organic compounds. In the limit it is possible to synthesize a cell and produce agglomerates of cells in the form of artificial meat. We find that producing a synthesized

cell has been a long journey for scientists because it requires a high order of intelligence that is not possible in one attempt, our mind functions in an incremental way improving a bit on the previous position each time.

(b) Structures produced externally starting from a cell. Living cells, which are part of a body, possess some biological intelligence (of the soul). Starting from this level more complicated structures can be produced with the application of psychical intelligence. All in-vitro stem cell research falls in this category. With further application of psychical intelligence the cells could be assembled to form organs and parts of life system. Note that a minimum biological intelligence contained in the stem cell is essential for this purpose; the psychical intelligence alone is not enough to produce the results.

(c) Biological structures produced internally from stem cells. Such structures are produced in – vivo employing stem cells. The structures developed inside a body for regeneration or repair purposes have input of biological intelligence of the soul in addition to psychical intelligence of the scientists employed in the process. By this process stem cells could be used to develop tissues, organs and parts of body systems in-vivo.

(d) Cloning. Clones of a particular species have been produced using various techniques. In this process the cells of the chosen species after necessary modifications are placed in the womb of females (or similar environment) for further development. According to Jain philosophy a soul must enter the object cell to produce the required body structure using its biological intelligence. Note that the soul of the cloned organism is different from the soul of the parent organism and therefore it will have different psychical intelligence. It is obvious that as the two souls have different sets of karma it is not possible to produce clones having psychical personality exactly similar to the donor soul.

3 Biological structures produced naturally by biological intelligence alone.

These structures are bodies of organisms produced naturally by biological intelligence of the soul without any input from psychical intelligence as happens in all normal beings. We find that such natural structures are far more superior to artificial structures produced by application of human mind indicating that the biological intelligence must be of very high order in comparison to the psychical intelligence, in respect of biological functions. The body structure is maintained in the living state because of the intelligence of the soul. When death occurs the soul leaves the body, which is now without intelligence. In the absence of intelligence the structure disintegrates and the body decomposes.

Conclusions

The concept of faculty helps in understanding the functioning of life system of organisms. The biological faculties (intelligence) unaffected by mind work on voluntary basis to regulate the biological processes in the organism. Examples of intelligent biological processes

claimed by scientists have been described in brief and these have been shown to be guided by the intelligence of the soul through biological faculties. The intelligence of the soul thus regulates the biological activity carried out by genes. The soul and matter together manage and operate the organic system in life. The soul responds intelligently to artificial changes in the body.

Biological structures have been classified based on use of soul intelligence and it is shown that many possibilities of producing artificial biological structures employing human mind exist. All such structures are essentially product of human intelligence. The claims that modern science has advanced new understanding of nature and biological processes of organisms must be seen as outcome of application of human psychical faculties (intelligence) that represent manifestation of only a small fraction of total intelligence potential of the soul. [The full potential is realized in the omniscient state and it is not difficult to imagine now that the Omniscient possesses infinite knowledge and nothing in space and time is unknown to him.]

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