International Journal of Recent Trends in Science And Technology, P-ISSN 2277-2812 E-ISSN 2249-8109
Special Issue, ACAEE: 2018 pp 311-329

Original Research Article

21st century biology establishes that life is beyond chemicals

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Abstract

The tremendous accomplishment of mechanistic thinking created a false conviction among scientists that the only type of causations pertinent to the scientific venture is the types Aristotle depicted as material and efficient causes. Thus, modern civilization tends to be about mechanical machines, not persons, and such a mindset irrationally excludes from the scientific domain not only the human mind (formal cause) and meaning (final cause), but also all manifestations of intelligence in non-human living entities. Throughout the history of modern science, biologists are continually trying to squeeze living organisms into the mechanistic clockwork image of the world. Influenced by Darwinism (which insists that life is the product of natural selection) scientists believe that all psychological behaviors (including the mind) can be reducible to natural process and physical laws. Therefore, for Darwinists, psychological behaviours are a mere result of evolutionary survival. Darwinism produced a general consensus among scientists for an extreme reductionist view that in a future based on gene analysis science can understand and control all the functions of living entities including psychological behaviour. However, till date, scientists like biologists and psychologists also do not know for sure which fastidious features of behavior are an outcome of either inherited (by genes and other biological factors) or acquired (by learning) characteristics. This is well known as the "Nature verses Nurture" debate within psychology. Before the advent of modern science people could easily understand the distinction between living (animate) objects and non-living (inanimate) objects through a simple observation of their movements. This plain wisdom that people had in the past is again getting confirmed in modern science where scientists are realizing that the responses of living organisms in different experimental situations are not a mere movement but are driven by goals.1 Cell biology further revolutionized the way 20th century scientists were seeing living organisms and 21st century science boldly accepts that "bacteria (without a brain organ) are small but not stupid".1 Therefore, 21st century biology views life forms as self-modifying beings.1 Modern science may doubt the very existence of any notion of self (because there is no way modern science can explain the self by mechanistic thinking) but the notion of "I" (self) is experienced by all scientists. Unlike mechanistic thinking in physical sciences, the study of life (biology) cannot avoid self-involvement and self is the object of a subjective reflexivity. Thus, understanding of life requires an inner folding, and through this inner folding an individual continues not only a connection with his/her 'self', but also relates to the other individual self. In the Bhagavat Vedānta the personalistic conception of the self is seen as the deeper reality of the ego, as that which brings about every relation to the external world. In the material concept of life the relationship between the individual and the self to which it relates remains external. The true 'self' in Bhagavat Vedānta is based on the concept of 'dynamic organic whole', where every individual member in the whole is meant to satisfy the centre of that organic whole – primeval personal Absolute. The speaker will discuss some of the mistakes that modern science has made in ignoring the personalistic concept of reality and thus will present an overarching conception of the self from Bhagavat Vedāntic philosophy as an alternative vision of reality.

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Quick Response Code:	Website: www.statperson.com
	Accessed Date: 26 March 2018

INTRODUCTION

The abiogenesis hypothesis maintains that chemistry made a transition to biology in a primordial soup. To keep the naturalistic 'inanimate molecules to human life' evolution ideology intact, scientists must assemble billions of links to bridge the gap between the inanimate chemicals that existed in the primordial soup and anatomically modern humans. Even though the proponents of a natural origin of life expressed much optimism for providing their theories, presently there is a

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detailed compilation of information seriously questioning this doctrine. This reductionistic ideology has always failed to answer two simple questions: 1. What is the minimum number of parts that are essential for a living organism to survive? 2. By what mechanism do these parts get assembled together? Evolutionists say a series of prebiotic processes and developments guide networks of dynamically linked small molecules and amphiphiles to form biological macromolecules, membraneous compartments, and finally primitive cells. However, none of these proposed pathways to life appears to be credible. The continuous advancement in various fields of science are not only providing major challenges to reductionistic ideology but are supplying increasing evidence for a systemic concept of life as an organic whole. Several leading researchers in the field of 'origin of life' are continually concluding that there are major scientific problems attached with all existing naturalistic 'origin of life' hypotheses. Only by taking into account all biological activities collectively as a system can a satisfactory elucidation of the living state be realized. At various times in its history, 'spontaneous generation' has been identified by two different concepts. They are: (a) abiogenesis, and (b) heterogenesis. Abiogenesis is the field of science dedicated to study how life might have arisen spontaneously for the first time from inorganic chemicals. On the other hand, the notion that life can arise from dead organic matter, such as the appearance of maggots from decaying meat is known as heterogenesis. For a long time major western thinkers like Newton, Harvey, Descartes and von Helmont accepted heterogenesis with full confidence. Francesco Redi by his experiments demonstrated that meat placed under a screen of muslin never developed maggots. The works of Schulze, Schwann, von Dusch and Schroeder provided significant challenges to heterogenesis, and finally in 1864 Louis Pasteur's famous swan-neck flask experiment sounded the death knell for this theory. Pasteur famously stated that "Never will the doctrine of spontaneous generation recover from the mortal blow of this simple experiment".[1] However, soon after the establishment of Pasteur's famous biogenesis theory, the reductionist school proposed an even more intricate and incredible form of spontaneous generation – abiogenesis. This hypothesis gathered its support mainly due to the collapse of the false dilemma of organic and inorganic matter (synthesis of urea in 1828 by Wohler), and the development of the concept of conservation of energy.[1] The modern form of chemical evolution theory began to develop following the proposal by Russian biochemist A.I. Oparin.[1] According to this claim, complex molecular arrangements and functions of living systems evolved from simpler molecules that preexisted on the lifeless, primitive earth. Thus, abiogenesis provided an ideal sense of balance to Darwinian evolution theory, requiring billions of years to go from dead atoms and molecules to cells, and then, via random mutation or natural selection, from cells to the varieties of living beings present today. In a famous letter to his botanist friend Joseph D. Hooker in 1871, Charles Darwin stated: "It is often said that all the conditions for the first production of a living organism are now present which could ever have been present. But If (and oh what a big if) we could conceive in some warm little pond with all sorts of ammonia and phosphoric salts, light, heat, electricity etc. present, that a protein compound was chemically formed, ready to undergo still more complex changes at the present such matter would be instantly devoured, which would not have been the case before living creatures were formed."[1] Darwin suggested that algae, amoebae and other such simple living beings were blobs of protoplasm which might have just appeared in some warm little pond by the chance combination of chemicals. Darwinian ideology imagines that a small number of relatively effortless changes in this protoplasm could show the way to developmental alteration. Natural selection would make sure that better adaptation would be preserved. On the other hand, changes which led to poorer adaptation would die out. Scientists influenced by this ideology believe that natural processes produce complex life forms from simple ones, which in turn came from dead chemicals. Based on such a foundation, abiogenesis proclaims that the first life had arisen by a chance accumulation of chemicals. The same is evident from the statement of Julian Huxley, one of the most influential evolutionists, "Evolution, in the extended sense, can be defined as a directional and essentially irreversible process occurring in time, which in its course gives rise to an increase of variety and an increasingly high level of organization in its products. Our present knowledge indeed forces us to the view that the whole of reality is evolution – a single process of self transformation."[1] However, the advancements of microbiology have helped scientists to look at life in a better way. Darwin's portrait of organisms made of a small number of simple chemicals has given way to one of astounding complexity even in the simplest living entities. The ordinary *E. coli* bacterium has not only miniature electric motors of exceptional efficiency, but also the equipment to fabricate, repair, maintain, operate and power them with an electricity generating mechanism. Consequently, the notion of the natural origin of primitive cells in the primordial earth is being severely challenged by the modern explosion of knowledge in microbiology and cellular biology. The issues attached to the 'natural origin of life' doctrine will not come to an end, even if one assumes that the so called necessary

chemical building blocks were accessible in the primordial atmosphere. Any theory of 'natural origin of life' on Earth needs the practical description of plausible pathways for the conversion from complex prebiotic chemistry to simple biology, understood by evolutionists as the appearance of chemical accumulation capable of Darwinian evolution. Primitive cellular life requires a certain minimum number of systems, like (1) the means to transmit heredity (RNA, DNA, or something similar), (2) a mechanism to obtain energy to generate work (metabolic system), (3) an enclosure to hold and protect these components from the environment (cell membrane), and finally (4) a unique principle (sentience) to connect all of these components together. It is incredulous for evolutionists to believe that all of these four systems appeared simultaneously in a spontaneous manner. Hence, the majority of followers of abiogenesis hypothesis are debating on the sequence of appearance of these events in the early Earth.

MATERIAL AND METHODS

The origin of life theories must clarify the origin of the distinctive phenomena which maintains life, such as reproduction, metabolism, and their corollaries (cell division, information carriers, genetic code, growth, maintenance, response to external stimuli and so on). Reproduction is undoubtedly crucial for the continuation of any form of life. For this reason, evolutionists believe some form of molecular replication must have been started spontaneously in the prebiotic environment as a simple, entirely physicochemical form of reproduction. On the other hand, cellular metabolism is understood as a set of chemical reactions that occur in biological systems to maintain life. This vital process helps organisms to grow, reproduce, maintain and respond to their environments. The metabolism process is classified in two different classes, catabolism and anabolism. The catabolism process produces useful energy and the anabolism process uses that energy to build components of cells such as proteins and nucleic acids. Through metabolic pathways in a number of steps one chemical converts itself into another chemical by a sequence of enzymes. Enzymes are essential for the metabolic processes, since enzymes permit biological systems to make necessary reactions that require energy. Hence, some researchers believe in the supremacy of metabolism[1] and others assume the supremacy of reproduction.[1] Thus, unlike the linear logic that mechanical and chemical systems follow, scientists are completely perplexed by the circular logic that life follows. Scientists cannot solve this riddle: 'which came first, the chicken (metabolism) or the egg (reproduction)?' Despite the massive advancements in the field of cellular biology, the changeover from microscopic chemical mechanisms to the macroscopically evident emergent properties that illustrate life remains unanswered. Even if creation of an enclosed vesicle is achieved, it does not assure functionality of a primitive cell. In order to be practical as a mechanism implicated in abiogenesis, membranes must be linked with all the materials indispensable to instigate life. A membrane must be capable of transporting material in and out of the boundary. Some type of transport system for nutrients and wastes would be compulsory to uphold the metabolism of the primitive cell. Moreover, both a primordial replicator and metabolic system must be interconnected in the primitive cell. Hence, such an arrangement would manipulate, generate and release the necessary chemicals during each cycle. However, it is uncertain what sort of equilibrium would ultimately need to be accomplished to make a transition from a chemical system to a biological system. In a purely physicochemical sense, if a stable membrane is synthesized, passive transport systems can be easily arranged. However, such a provision would robotically attain equilibrium, making continuation of further transport impractical.[1] Even insignificant unicellular living entities are *self-guided* and can utilize millions of special molecules dedicated for specific responsibilities within a functional cell. Advanced cellular biology now confirms that a functional cell is made up of a sophisticated network of co-dependent biomolecules. Many of these biomolecules are only observed in biological cells and not anywhere else in nature. Biological systems display astonishing accomplishments not because of an exceptional form of chemistry, but because a sentient creature can control chemical processes and subordinate them to a purpose intrinsic to the self-guided living being. Scientists are only making futile attempts at the moment to synthesize separately all the essential biomolecules by purely physicochemical means. The further and more complicated steps towards synthesizing functional cells are certainly beyond their thinking. A purely physicochemical transition from chemistry to biology is impossible. The delusion of modern biology is mostly driven by the reductionist mindset which is perfectly represented in the statement of Francis Crick, the co-discoverer of the structure of the DNA molecule: "The ultimate aim of the modern movement in biology is to explain all biology in terms of physics and chemistry".[1] Thus scientists followed a path of dissecting the biological systems into their constituent parts to find an effective explanation for the chemical basis of various living processes. However, throughout the history of modern science many prominent scientists continually realized that this approach has reached its limit and we

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can find the evidence of the same from the statement of Noble prize winner, Szent-Györgyi: "As scientists attempt to understand a living system, they move down from dimension to dimension, from one level of complexity to the next lower level. I followed this course in my own studies. I went from anatomy to the study of tissues, then to electron microscopy and chemistry, and finally to quantum mechanics. This downward journey through the scale of dimensions has its irony, for in my search for the secret of life, I ended up with atoms and electrons, which have no life at all. Somewhere along the line life has run out through my fingers. So, in my old age, I am now retracing my steps, trying to fight my way back."[1] Scientific studies proclaim that 99% of the mass of the basic unit of life – 'cell' is composed of the elements like carbon, hydrogen, nitrogen, oxygen, phosphorus and sulfur.[1] Whereas, the rest, 1% includes elements like calcium, iron, zinc, sodium, potassium, chlorine, selenium, iodine, and a very small amount of molybdenum, manganese, fluorine and chromium. Despite the fact that a cell has thousands of chemicals made of these elements, they amazingly follow an ordered sequence or pathway. There is no intrinsic intelligence in those elements or chemicals to orchestrate the complex set of coordinated reactions that we find in the living cell. Thus, mechanistic and reductionistic science continually encountered a surprising observation: unlike the non-living realm (say, a dead cell), the chemical reactions in a living cell do not depend on the mercy of random reactions taking place in an enclosure. For living processes *specific space and time are very important* for different reactions that we observe in the bodies of different living entities. For example, cell functioning demands an active presence of a specific enzyme in the right place (*space*) at the right time (*time*) to co-ordinate a vital sequencing of reactions. Without this orderly and controlled sequence of reactions the metabolic pathway of the cell will completely fail, and errors in a metabolic pathway can cause disorders and disease. Similarly, in an embryological development 'where (*space*) and when (*time*) organs are produced' is very vital for all the living organisms. Hence, the laws of ordinary chemistry (applicable to random reactions) alone can never explain the living processes because the living processes are intrinsically well controlled and coordinated. A living cell has 'checkpoints' to facilitate such intrinsically controlled reactions along a pathway, which is very much essential for living processes to prevent the occurrence of unnecessary series of reactions. To avoid a chemical mess the living cell uses specific pathways and 'biological containers' by which it keeps the opposing reactions separate from one another. Hence, unlike dull chemicals in a non-living realm, life has the intrinsic intelligence to guide the chemicals to ensure that reactions are elegantly balanced in favor of a positive outcome. Whether an immaterial soul is responsible for this order and sequencing that we observe in a living cell (or living organism) is still an open question.[1] However, what is now getting slowly confirmed from the evidence is that a mere chemistry alone is not enough to solve this riddle.

The Delusion of an Impersonalist Informatic Approach to Understand Life: To overcome the above impasse molecular biology is gradually getting devoured by information theory and cybernetics. Like the man searching for his key under the lamppost, scientists currently focus their thinking about the secrets of life almost completely on DNA sequences, because their capability to interpret and control them lies at the heart of present day biotechnology. Following the mindset of physical sciences, biologists have only tried to find a lawful mechanics of matter to understand life. However, all life forms (even a simple cell) display apparent stability and ability to reproduce, which clearly disobey the second law of thermodynamics–the notion that there exists an universal propensity towards dissipation, disorder and sooner or later an entropic heat-death. Biologists, hypnotized by the physical sciences, have always struggled to answer the question: if life happens to follow the laws of matter then why has life assumed "immortality" across generations as its prime identity. Nevertheless, futile attempts continue till date to explain the organizing power of life in terms of the dissipating force of thermodynamics. Mesmerized by the success of information theory and cybernetics applied to mechanical systems, biologists have tried to solve the above puzzle by the application of the same informatics approach. In the midst of this revolution biologists are extremely cautious to not allow the entrance of any notion of "soul" or "God" to account the natural order. Biologists live with the belief that the stuff (say, DNA) of the body of the living organism possesses informatic qualities. In this framework, by oversimplifying the actual vision of Schrödinger in "*What Is Life? The Physical Aspect of the Living Cell*", a few biologists believe that the DNA of organism contains the codes that help the living organism defeat thermodynamic decay by recurrently renovating its own ordered nature. Following that vision many biologists view life as a mere chemical-mechanical order despite the fact that the optics of modern science continually failed to decipher the instruction book inscribed in a so called secret code.[1] Like Maxwell's fantasy demon *personally* controlling a small door between two chambers of gas to decrease entropy which in turn help violate the second law of thermodynamics, biologists at present believe that the hidden *impersonal*

codes in DNA direct biological reproduction and all other activities of life. However, we have to understand the major difference in this metaphorical comparison. Maxwell's demon, being a sentient being, has the ability to be aware of the speed of the molecules and thus the demon can wishfully manipulate them to meet the purpose in the mind. On the other hand, unlike Maxwell's demon, a passive entity like DNA (or the so called codes in DNA) has nothing in it to be aware of the environment and to act accordingly. In the words of American biologist James A. Shapiro from University of Chicago

"DNA + 0 —> 0, makes the point that DNA cannot do anything or direct anything by itself; it must interact with other cell molecules. So all genome action is subject to the inputs and information-processing networks we know to operate in living cells."[1] Unlike dead matter (say, DNA), even in a simple cell we can observe freedom in its decisions and actions, which are prime symptoms of life. Thus it is a mere unscientific presupposition that a genetic program will establish a straightforward correspondence between genes, structures and functions. Rather, the realization of the functioning of tranposons, exons, introns, the splicing and post-translation modifications made such relations plastic, context-dependent and contingent. Genetic science must recognize that a mere accumulation of information is not enough to imitate the functioning of an organism because we need a sentient entity (say, a living cell) to make use of that received information (say, from the environment) in a meaningful way. The proponents of the mathematical theory of communication Claude E. Shannon and Warren Weaver also stated that "information must not be confused with meaning. In fact, two messages, one of which is heavily loaded with meaning and the other of which is pure nonsense, can be exactly equivalent, from the present viewpoint, as regards information"[1]. Thus, informatic theories can be seen as ill-founded metaphorical resources which take biologists away from the real concept of life sciences. Based on the great advances in genetics during the past century, 21st century biology underscores our need ultimately to move beyond the genomic analysis because now we know that genes' product function in multiple pathways and the pathways themselves are interconnected in networks. Thus, there are many more possible outcomes than there are genes, and however profoundly we investigate a genotype we cannot forecast the actual phenotype. Such a blemished approach can only offer the knowledge of the universe of possible phenotypes and it can never explain how living organisms can curb these phenotypes in order to produce a very stable physiology and embryology from such a potentially non-deterministic universe of possible phenotypes. Biologists really do not know the source of order and organization that we find in living organisms and it is this robustness that suggests that biology needs the concept of "immaterial soul" to understand life in its truest sense. In 21st century biology the realization has arisen that the cognitive nature of life at all levels has begun presenting significant challenges to the views of materialism in biology and has created a more receptive environment for the soul hypothesis. Therefore, James A. Shapiro states that "life requires cognition at all levels"[1] and according to *Śrīmad Bhagavad-gītā*, consciousness is the inferential proof or symptom of existence of the soul (*ātman*). To develop proper explanations of life (which also includes mind and consciousness), biology needs a much more sophisticated philosophical foundation than the rather simplistic conceptual framework of the physical sciences.[1]

The Delusion of Understanding Life/Matter in terms of its 'Basic Building Blocks': The proponents of abiogenesis believe unguided energy is the means by which simple molecules can be organized into more complex molecules. However, from the law of nature or from the second law of thermodynamics we know the order that emerges from undirected external forces not only has a momentary disposition, but does not get bigger, unless a directed external exertion is supplied. Random flashes of electricity used by the famous Miller Urey Experiment can transform simple molecules into more complex building blocks. But the very next moment, new electrical flashes supplied may destroy these same building blocks. The larger the building blocks, the faster they will be damaged. Hence, to protect building blocks from the destruction by new flashes of lightning, the building blocks should be guided towards a distillation flask. Moreover, even if scientists can g*et al*l the so called building blocks of life at once (say, from a living cell by puncturing it with a sterile needle) then also scientists cannot construct a living cell from it. For example, scientists claim that they know the chemistry and physics (mechanism) of photosynthesis[1] but they cannot use that knowledge to produce a blade of grass from the so called building blocks. 'Life always comes from Life' and biogenesis is an empirically established law in biology. Similarly, "Matter comes from Life" and our Sri Chaitanya Saraswat Institute's Funding Director Sripad Bhakti Madhava Puri Maharaja, Ph.D. says that: "The complex molecules, DNA, proteins, and so on are not found lying around in nature but only in living organic bodies. The bodies of living organisms themselves are physical but do not exist as such in nature without the life principle they are built on. In this sense we can say that matter comes from life." Hence, life is the basis of both life and matter. However, ignoring this plain

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fact, the self-indulgent framework of understanding life in terms of its basic building blocks seems full of flaws and biologists must learn a lesson from modern physics (which is considered as the basis of natural science) where it completely challenges even the concept of understanding matter in terms of its basic building blocks. Surpassing the limitation of classical ideas, the revolutionary realization of atomic and subatomic worlds in modern physics demands a deep revision of many of our basic concepts of matter, space, time, cause-effect and our general outlook on the world around us. The concept of the smallest indivisible unit of matter lead to the concept of the atom, and the traces of this concept can be found in ancient Greek philosophies of Leucippus and Democritus. We find a clear line between spirit and matter with the Greek atomists, where they believed that matter consists of numerous passive and intrinsically dead particles (basic building blocks) which move in the void. Even though the cause of their motion was not well explained in those philosophies, there was a notion that such motion is associated with external forces of spiritual origin and thus fundamentally different from matter. This idea gradually lead to the development of dualism between mind and matter (and also between body and soul) in Western philosophy. By proposing two separate and independent realms as *res cogitans* (that of mind) and *res extensa* (that of matter), Rene Descartes provided an image of the material world as a gigantic machine that constituted of huge numbers of different dead objects. The mechanics of Sir Isaac Newton helped further such a mechanistic world view and thus it became the foundation of classical physics. Even some of those in West, who believe in God, also maintain this dualistic world view. Therefore, they see the laws of nature searched for by modern science as the laws of God and for them the world is subject to the invariable and eternal laws of an external God. Rene Descartes' concept of "*Cogito ergo sum*: I think, therefore I exist" also led the Western world to believe that the individual self is identical with the individual's mind which is disconnected from the body and reality as a whole. This is the cause of cultivation of 'isolated ego' or 'false ego' that is prominent among modern educated people. Such a dualist world view is the cause of extreme exploitative mentality that we see prominent in our society and a dangerous effect of the same is well evident in the form of degraded environmental conditions all over the world. Thus the philosophy of Descartes is the foundation of the development of classical physics and has great influence on Western thought in general. Even though the root of 20th Century science is from the Cartesian split originating from a mechanistic world view, the advancement in scientific studies have now helped scientists to have a completely different understanding of matter than what is simply presumed in classical physics. The advancement forced atomic physics to get trapped into a puzzle of dual nature of light or electromagnetic radiation, where on the one hand, the interference phenomena[1] gives the impression that the radiation must consist of waves and on the other hand, the production of the photoelectric effect (ultraviolet light kicks out electrons when it is shone on the surface of some metals) by electromagnetic radiation gives the impression that it must consist of moving particles. The scattering experiments of X-rays also display this type of dual nature where despite the fact that they display an interference pattern similar to that of waves, these experiments can only be interpreted correctly if they are depicted as collision of light particles. A particle is seen as an entity confined to a very small volume and in contrast a wave is spread out over a large area of space. Modern physics is forced to accept that electromagnetic radiation must simultaneously contain these contrasting entities that we know as particles and waves. Much beyond our sensory perception, 20th Century science sees the subatomic particles with the above contrasting nature and thus, it thoroughly dismisses the notion of the Newtonian mechanistic model of the universe which, like the Democritean model in ancient Greece, tries to reduce everything to the motions and interactions of hard indestructible atoms. Quantum Mechanics is a progress from observer independent classical physics to an observer dependent description of reality, where it has shown us that we are not directly dealing with the Science of Object but we are dealing with the science of knowledge of the object. Thus, physics has realized that matter does not have an independent existence apart from consciousness. In other words, 20th Century science confirms that there are no ultimate building blocks for matter. In Vedāntic philosophy matter is classified in two broad categories: (1) *sthūla dravya* (gross matter) and (2) *sūkṣma dravya* (subtle matter). The first category *sthūla dravya* (gross matter) is further classified into five more subcategories (*pañca-mahābhūta*): (a) *bhūmiḥ* (earth or solid substance), (b) *āpaḥ* (water or liquid substance), (c) *analaḥ* (fire), (d) *vāyuḥ* (air) and (e) *kham* (ether or space). The classification of these five subcategories of gross matter is based on the sense objects (*pañca-tanmâtra*): (i) *s'abda* (object for ear – sound), (ii) *spars'a* (object for skin – touching sensation), (iii) *rûpa* (object for eye – form), (iv) *rasa* (object for tongue – taste), and (v) *gandha* (object for nose – aroma). Among the five subcategories of *sthūla dravya* (gross matter) *kham* (ether or space) is most subtle because we can sensually observe *kham* (ether or space) only through hearing. When we go towards further grosser levels we can sensually observe:

vāyuḥ (air) through hearing and touching; *analaḥ* (fire) through hearing, touching and seeing; *āpaḥ* (water or liquid substance) through hearing, touching, seeing and tasting; *bhūmiḥ* (earth or solid substance) through hearing, touching, seeing, tasting and smelling. Therefore, *bhūmiḥ* (earth or solid substance) is the grossest element among the five subcategories of *sthūla dravya* (gross matter). Modern science has continually made several failed attempts to understand the entire reality within the realm of *sthūla dravya* (gross matter). The mysterious realm of *sūkṣma dravya* (subtle matter) is beyond the reach of sense-based observation methodologies that are commonly practiced in modern science. The second category of matter *sūkṣma dravya* (subtle matter) is classified into three more subcategories: (a) *manasā* (mind), (b) *buddhi* (intelligence) and (c) *ahaṅkāra* (false ego). In the gross body, the senses are primary and if they are removed, no world is apparent to us. Above the senses is the mind (*manasā*) and it is the supreme ruler of the senses. If we are not mindful of the sense objects, then even though something is moving in front of our eyes we cannot see it. Thinking, feeling and willing in different degrees are the ubiquitous subjective activities of life that are observable in all life forms. Modern objective science cannot address the fulfillment aspect of life because, being private to one's own self, scientists completely ignore the scientific analysis of these subjective activities: thinking, feeling and willing. However, like sensual experiences, anyone can objectively experience his/her own thinking, feeling and willing. Therefore, anyone can do a scientific study of this inner non-sensuous nature by self analysis or introspection. The mind basically deals with acceptance (*saṅkalpa*) and rejection (*vikalpaa*)–the faculty of understanding, or holding thoughts in their separation/distinction as either/or. And, above the mind is the teleological reason or intelligence (*buddhi*), which is the inferential faculty determining if/then. The mind can determine something, but it is the intelligence that helps an individual to come to a decision to accept something or not. The false ego (*ahaṅkāra*) is the identification of the self with the body and the bodily identities (nation, cast, color, creed and so on). The mind, intelligence and ego are dependent on the spirit soul (*ātman*). The soul (*ātman*) consciously experiences and interacts with the gross matter through a subtle body (mind, intelligence and false ego). In biology the studies are based on physicalistic approaches and we know things by mere sensual observations. Therefore, objects like DNA, protein, enzymes and so on are nothing but a collection of our sensual data. The concept of matter in modern science is nothing but certain combinations of our sensual experiences or *pañca-tanmâtra*: *s'abda* (object for ear – sound), *spars'a* (object for skin – touching sensation), *rûpa* (object for eye – form), *rasa* (object for tongue – taste), and *gandha* (object for nose – aroma). Following the concept that ultimate reality consists of undividable, purposelessly moving matter, modern science tries to see everything in terms of electrons, protons, photons and so on. All these entities like electrons, protons, photons and so on are nothing but our experience of different sensations. In modern science we never try to inquire if there is something that exists beyond our sensual experiences and therefore scientists try to reject all entities as unreal which are sensually unobservable. If there is nothing that exists beyond our sensual experiences then why does the same individual see the electron as a particle using particle detectors and as a wave using wave detectors? According to the Vedāntic explanation it is our knowledge or consciousness – *cit* (the information that we have about the object) that shows us different things. The verses 13.6-13.7 of *Śrīmad Bhagavad-gītā*, explain about the field of activities:

mahā-bhūtāny ahaṅkāro
buddhir avyaktam eva ca
indriyāṇi daśaikaṁ ca
pañca cendriya-gocarāḥ
icchā dveṣaḥ sukhaṁ duḥkhaṁ
saṅghātaś cetanā dhṛtiḥ
etat kṣetraṁ samāsena
sa-vikāram udāhṛtam

Translation: The five great elements, false ego, intelligence, the unmanifested, the ten senses and the mind, the five sense objects, desire, hatred, happiness, distress, the aggregate, the life symptoms (consciousness – *cetanā*), and convictions – all these are considered, in summary, to be the field of activities and its interactions. In the material plane, the spirit soul (*kṣetra-jña* – knower of the field) experiences (becomes conscious of) things through a material field that consists of both gross and subtle matter. Therefore, in the field of activities the information exchange happens through these gross and subtle channels. The studies in biological sciences are dominated by a reductionistic approach where we are only trying to find out the material substances that constitute the bodies of different living organisms. The bodies of all forms of life, starting from bacteria to human beings, are made up of the same set of particles and yet we call some of these living entities a bacterium, plant, fish, frog, elephant, human being and so on. What is that element in us that makes us distinguish all these life forms? The approach in physical sciences only tries to study the physical differences and it does not address the differences that arise at the conceptual level. To understand a "thing" we first sense the thing and then it is our "concept" that unites those sense data into a thing. Therefore our interpretation of things is not mere sensual

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observation but it relies on an underlying concept. Even "science" itself will not exist if we consider that matter is the only existential reality. Without consciousness (or concept) of that which exists science cannot come about. However, why at all do we want to know the existence? Is our real goal to endlessly gain knowledge (being conscious) of existence? A mere attempt to gain such knowledge endlessly will be like Sisyphus who was punished by being forced to roll an immense boulder up a hill, only to watch it roll back down, repeating this action for eternity. What is that inner motive that drives us to do different things in our life? According to Vedāntic philosophy, it is our inner hankering towards the fulfillment of being that drives our activities and existence.

Modern Science only deals with Impersonal Dead Objects: What is the most fundamental particle that our universe made up of? As discussed in the previous section, the reductionistic school has not yet figured that out. In the past, the atom was considered the most fundamental indivisible unit. However, later it was found to be made up of three particles: electron, proton and neutron. These days scientists are talking about further finer subatomic particles. Hence, there is serious doubt about the prospect of scientists settling down to a lasting, final understanding regarding the most fundamental particle that our universe is made of. Moreover, from the most fundamental particle (if ever scientists can manage to find one) to the functional primitive cell level, life forms handle extreme parallels and interactive courses of actions over several orders of magnitude of size. Without a proper understanding of the life principle, biologists captured by the ghost of the naturalistic origin of life believe that they can explain this scale of complexity through purely physicochemical means. Biologists conclude that it doesn't matter what takes place within the organisms, for they can reduce all of that to chemistry and physics. Using physics and chemistry, scientists try to explain the building of matter from atoms and molecules. The atomic relations are illustrated by chemistry. On the other hand, the lump of matter produced from an accumulation of atoms is explained by laws of physics. Based on this, biologists may argue that the whole matter of which a life form is composed does fit into the dominion of physics and chemistry. Under this impression, they visualize that the protein–protein, protein–DNA or other bimolecular interactions within a living cell are merely the outcome of physical processes. However, anyone can understand the distinction between living (animate) objects and non-living (inanimate) objects through a simple observation of their movements. The trajectory of motion of an inanimate object like an artificial satellite can be predicted in terms of laws of mechanics. However, the motion of an animate object like a bird cannot be understood with the same principle. This is because an animate object is self guided. To stress the same idea we would like to present one more example: Newton's first law of motion is applicable to a spherical toy (often made from glass, clay, steel, plastic or agate) that we call marble (inanimate object), but it cannot be applied to a tortoise (animate object). The motion of inanimate objects is determined by an external force. We need an external force to move a marble at rest. On the other hand, animate objects display a self driven spontaneous movement. A tortoise at rest can decide when it wants to move and no law in physics can determine that decision. Searching for a consistent pattern is the common means in both top-down and bottom-up approaches that we often come across in physical science. In non-biological systems scientists look for a consistent behavior of elementary particles, which is not the case in a biological system. Cellular interactions are inconsistent and irreproducible.[1] A living cell is a milieu of pure dynamic activity. Due to this reason we cannot apply top-down and bottom-up approaches to develop laws for a biological system. We may observe some consistent patterns of behaviors in living organisms. For example, by listening to the clap of our hands a bird close by will certainly fly away with a reliable degree of predictability. However, it is impossible to explain this repeatable pattern in terms of a bird microarray profile before and after the clap. Modern researchers should recognize the fact that the molecular level explanation is undoubtedly insufficient to elucidate the complex activities of living organisms. By a simple observation of an organisms' growth, irritability, reproduction, metabolism, and so on, one can make out remarkable distinctions between animate and inanimate objects. Hence, biologists must inquire about the deeper question: what automates the animate or living objects. Motion of inanimate or dead objects (matter) is determined by physicochemical laws. The activities of living entities are not determined by any physicochemical laws. Spontaneity is the nature of all life forms or animated objects. Self-determination or freewill is the intrinsic nature of life. That is why life is self-caused "life comes from life – biogenesis" and abiogenesis is only a misconceived ideology of materialism. Unlike matter, every living entity aspires for fulfillment. Fulfillment is an impetus for everyday human behavior and is the basis of "Subjective Well Being". However, modern science does not have the deeper understanding of the root cause and solution for this innate need because it tries to find the answer for everything in inert matter. In general Western philosophy does not address the subtle nature of reality to its minute details and one can easily verify this by following a

comparative analysis of Western and Vedāntic philosophies. Modern science is based on the biased and prejudiced notion that nothing (including living entities) has an intrinsic purpose (internal teleology). However, a simple careful observation gives the clear impression that all living organisms have interests that provide a reason why all of them care about theirs and other individuals' (belonging to the same species or any other living entities outside the species to which the individual belongs) survival. Thus modern science continually failed to construe what is in a living organism that is responsible for its inherent quest towards its self-maintenance. Accepting the materialistic and mechanistic stands of modern science, educated people have started doubting the intrinsic value of life (both human and non-human). In the vision of modern science it is very difficult to create a moral consideration even for fellow living entities. Thus, environmentalists and other social activists are having a hard time convincing modern educated people about the due respect that life and our environment deserve. In order to prevent any further unthinking destruction of the natural world by human beings, many environmentalists genuinely feel that humanity certainly has an urgent need to get itself released from the bondage of the dangerous anthropocentric view of modern science about life and reality in general. We obviously need a very different vision about reality to have a genuine moral regard for other human individuals apart from oneself, non-human living entities and the environment as a whole. The concept of the organic whole from Vedānta (which will be discussed at the end of this article) can certainly help humanity to overcome the delusion that is being created by the hegemony of scientism. So, plainly speaking, modern science does not really know what it means for something to be "alive". In the mechanical and molecular vision of life (that modern science follows) there is no way that we can establish the obvious, that there are indeed such states as living organisms and ecosystems that have intrinsic value. On the other hand, like a few ecocentrists, Vedānta also advocates that the land, habitats and the reality as a whole basically are alive just as much as individual organisms are. Following the route of the mechanistic approach physicists basically try to understand everything from an impersonalist point of view. The different discoveries of the mechanistic approach certainly play a vital role in our day to day life, but this cannot be used as an excuse to support the practice of abstract reductionism–the blind presumption that the same mechanistic approach that we use in physics is also equally applicable to the study of chemistry and biology. Mechanics can help us understand the interaction of different parts in a mechanical system where the parts maintain rigid identities. For example, in a bicycle the peddle and seat maintain their rigid identities both in the assembled and unassembled state of a bicycle. On the other hand, unlike mechanical systems, the chemical constituents in a chemical system maintain relational identities. For example, an acid can be determined only in relation to base or alkali, and a neutral salt is the product of their reaction, where all the quality of their original acidity or alkalinity is lost. The approach that we follow in mechanics to understand a mechanical system (say, a bicycle) is not appropriate to deal with this completely different principle that we observe in a chemical system (say, NaCl). Furthermore, a biological system (say, a living cell) is not an outcome of either mechanical assembly or an aggregate of mere chemical reactants. A cell is a living (biological) system and it cannot be seen as a complex of subsystems of mechanical and chemical systems consisting of biological cellular-maintenance metabolism, contained and protected by an outer membrane. That which is seen by the approaches in physical sciences (physics and chemistry) as parts of a living cell, are in reality unified by the living cell as integral members of cell itself. The cell actively maintains the character and dynamic nature of the system because biological systems are characterized by an internal teleological unity. This internal telos that we observe in biological systems is not prominent in chemical or mechanical systems. A profound insight into this ontological distinction between mechanical, chemical and biological systems can be found in a very interesting article "The logic of life" written by our institute's founding director Sripad Bhakti Madhava Puri Maharaja, Ph.D.[1] According to Vedānta there is a specific purpose and means by which material Nature (the World that we observe with our material senses and mind) results and that cannot be conceived at the level of mere material Nature itself. Thus, to develop a genuine knowledge about reality one has to go beyond the mere appearance of the World. And to begin that process, the first aphorism of *Vedānta-sūtra* states that under the guidance of a spiritually realized being, we must inquire into our true nature as spirit (*athāto brahma jijñāsā*). A myopic impersonalist point of view that modern science advocates cannot impart the knowledge that can be properly applied to fulfill the true purpose of life, and also we cannot correct the severe imbalance that has been created by misdirected civilization under the influence of the impersonalist vision of modern science. To make any real progress in our search for real knowledge we have to first understand our real self and thus try to overcome the notion of the false self (indentifying the material body as our true self). In an ordinary consciousness we only observe the objects (or matter) that we can experience and thus we do not try to seriously think about 'who is the

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seer', 'who is the listener', 'who is the knower' and so on. Therefore, in a material analysis we simply experience matter and ignore the 'self' or the 'subject': 'listener', 'knower', and so on, because we do not experience them. In Vedāntic philosophy the path of self-realization or spiritual life begins when the subject becomes the object of its own study. As we progress to a higher level in our spiritual journey we can also experience the self and that is known as self-consciousness or self-realization, which is beyond the material sphere. In such a spiritual plane both object and subject are spiritual and the subject-object duality is negated by simultaneous identity and difference between subject and object. In Sri Chaitanya Mahaprabhu's teaching it is known as *achintya-bheda-abheda-tattva* – simultaneous difference and non-difference. In the material sphere sometimes a human being is also conscious of consciousness and yet he/she is also conscious of matter (a non-conscious body or bodily consciousness). Under the guidance of an expert self-realized saint one can transcend this transient plane of matter (bodily consciousness) and can attain the spiritual plane where everything is made of the same conscious principle. It is known as the science of the soul in Vedāntic philosophy. In western philosophy Aristotle called it pure form without matter (*noesis noesios*). The cultivation of this science of self is completely missing in modern objective science and without including the study of the self (scientist) in our scientific studies we cannot achieve a complete scientific understanding of reality. Modern civilization must properly recognize this fundamental flaw of materialistic science to find the proper solution to the problems that our civilization is witnessing at present.

Scientists Must Overcome the False Ego of their Scientific Knowledge: On the one hand, the particularist tendency in modern science demands that scientific assertions need to be true to the typical and even arcane practices of different sentient subjects (scientists) in the different fields of their specializations. And, on the other hand, the generalist tendency seeks to place scientific assertions within a general epistemological framework. A wider scientific process takes generalization as an essential component and scientists are often bereft of an ideal world where they can test their hypothesis on a sample of an entire population. With a limited knowledge of a certain representative group scientists try to relate to the entire reality. But such types of naive approaches will always face problems and we can find a hint of the same from the question raised by the paper "The weirdest people in the world?": "Behavioral scientists routinely publish broad claims about human psychology and behavior in the world's top journals based on samples drawn entirely from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies. Researchers – often implicitly – assume that either there is little variation across human populations, or that these "standard subjects" are as representative of the species as any other population. Are these assumptions justified?"[1] Modern science has no way to come out of the trap of these two opposing forces that control scientific thinking. Moreover, the logical positivists think that there is no fundamental difference between epistemology of modern science and other everyday knowing including different beliefs (for example, statements made by different sages, religious scriptures, ancient traditions and philosophical treatises). This concept is best emphasized by Einstein in *Out of My Later Years*: "The whole of science is nothing more than a refinement of everyday thinking." The logical postivists assert that only statements verifiable through empirical observation are cognitively meaningful. However, the foundation of empiricism is based on individual sensory experience and scientists practicing this methodology are having reservations about the inferences that may take certain individuals much beyond that limited experience. Moreover, it is irrational to think that all the things (say, the "thinking" of a scientist) that modern science deals with are given of experience (as empiricists presume). Scientists use "thinking" to analyze and interpret the data and without "thinking" scientists cannot discriminate, divide, compare, measure and categorize. Thus, without "thinking" we cannot have any science at all, and that "thinking" itself is inaccessible to the methodology of empiricism. Without overcoming the delusion of the notion of exact science, scientists cannot appreciate the deeper insights of the personality aspect of reality that is emphasized in different philosophies and world religions. With the false ego of scientific knowledge modern science in general tries to devalue any intuitive insight of different philosophers and world religions. If modern science wants to go beyond the mere external appearance of reality then it must equally respect both rational and intuitive knowledge. Bhagavat Vedānta especially emphasizes the complementary nature of both intuitive and rational knowledge. For example, Bhagavat Vedānta explains that sentient life is primitive and reproductive of itself – *omne vivum ex vivo* – life comes from life. This is the scientifically verified law of experience – biogenesis. On the other hand, the view of modern science that life originated from matter (abiogenesis) is an unverified ideological presupposition that has no scientific or observation-based evidence to support it. *Śrī Īśopanisad* also emphasizes the same with the concept of 'Organic Wholism':[1] "*oṁ pūrnam adah pūrnam idaṁ pūrnāt pūrnam udacyate pūrnasya pūrnam ādāya pūrnam evāvaśisyate* – The 'Organic Whole' produces 'organic

wholes'. An 'organic whole' cannot arise from parts that have to be assembled. That process can only produce inorganic, mechanical or chemical processes, not living organisms." A similar conclusion was made by Rudolph Virchow[1] in 1858, "*omnis cellula e cellula*" ("every cell comes from a cell"). Thus based on empirical evidence of biogenesis, Bhagavat Vedānta advocates that the Supreme Cognizant Being (the First Life) is the original source of everything, and His different variegated energies manifest themselves in the gradational forms of all sentient and insentient nature. Therefore, in contrast to the "objective evolution of bodies" delusion of Darwin and his followers, Bhagavat Vedānta advocates the idea of subjective evolution of consciousness (where the soul transmigrates into the different forms which are suitable for the consciousness that soul has cultivated during its life time) as the developing principle of the world. There is no scientific proof for objective evolution of bodies (bacteria changing into a fish or frog). It is a common practice in modern science where based on evidence many presumed concepts are replaced by new concepts. If we are following the same process that modern science follows then there is a valid scientific reason behind the evidence based refutation of evolution theory that commonly misguides the innocent students. If microevolution (small changes like bacteria adapting to new drugs or we humans adapting to a new environment) constitutes most of evolution theory then there should not be a problem for any scientist to accept evolution theory. In contrast scientists have already accepted that it is not easy to do experiments on macroevolution – a big change like bacteria to fish or ape to human being. However, in literature we can find a few experimental studies on bacteria which disprove macroevolution. For macroevolution studies on bacteria one can refer to the work 'From Here to Eternity—The Theory and Practice of a Really Long Experiment'[1] of Prof. Richard Lenski from Michigan State University. For the last 27 years he has been experimenting on evolving bacterial populations. Even though he has already witnessed more than 60,000 generations of these bacteria, the bacteria remained bacteria and do not form into something else. Hence at present scientists propagate a purely faith based opinion on the name of science. The fossil record also does not prove this concept that macroevolution is nothing but the repeated rounds of microevolution added up.[1] There is no scientific justification for the rigid stand to presume evolution as the cause of the origin of life (following chemical evolution) and biodiversity. Scientists under the banner of "the third way of evolution"[1] have realized the unscientific nature of evolution theory that is commonly taught in different universities and colleges across the world. This realization is purely based on scientific evidence. Learning is a process of overcoming ignorance and scientifically questioning "evolution theory" is also a part of that process. There is no need to abandon science and scientifically questioning evolution theory is not equal to the process of abandonment of science because science does not mean "evolution theory". The scientists under "the third way of evolution" have already supplied significant scientific evidence against the concept of Darwinian type of evolution. That itself is enough to demand a change in the syllabus to meet the revolutionary realization of 21st century biology. However, at present even that much humility is not shown by majority of scientists and hence Joseph A. Kuhn, M.D. states in his paper 'Dissecting Darwinism'[1]: several of the textbooks continued to incorrectly promote the debunked Miller-Urey origin of life experiment, the long-discredited claims about nonfunctional appendix and tonsils, and the fraudulent embryo drawings from Ernst Haeckel. In essence, current biology students, aspiring medical students, and future scientists are not being taught the whole story. Rather, evidence suggests that they continue to receive incorrect and incomplete material that exaggerates the effect of random mutation and natural selection to account for DNA, the cell, or the transition from species to species." Selfishness is the centrepiece in evolution because it propagates the concept of survival of the fittest. Without any foundation, how can the concept of (objective) evolution or the materialistic world view teach the concept: 'destroying species and our environment is bad for us.' Every organism is dependent on other organisms for food and survival. Without exploiting other living entities and the environment how can the evolution justify survival? Evolution also does not explain: by what mechanism 'a piece of matter'/'the first life (first cell)'/'the successive living entities' developed the knowing ability that helped them realize that 'destroying species and our environment is bad for us.' Thus, teaching of evolution theory is actually a great disservice to human civilization. Evolution theory tries to cultivate a materialistic attitude in society, where individuals try to find themselves in a position of superiority, which would allow them to exploit and oppress nature. If someone feels the urge to exploit or oppress other human beings then evolution theory justifies that urge. According to evolution theory the mood of exploitation and oppression is the natural instinct of every individual which is established by millions of years of evolution. If that is true then why is there a judiciary system in our society to discipline these bad urges. Evolution theory propagates many such delusions that are utterly against our true spiritual nature (living as a serving unit in an organic whole) and thus is an extremely

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harmful, unscientific concept. A genuine scientist follows the evidence wherever it may lead. Our founding director Sripad Bhakti Madhava Puri Maharaja, Ph.D. says "the work of our Institutes is to encourage this type of scientific research for the benefit of Mankind, and to follow the evidence wherever it may lead. We find different diversity in different historical layers in the fossil record. According to the Vedic view all living entities are related to each other like a net, with the different species representing the nodes of that network. Vedic chronology talks about different Yuga cycles (the four Yugas) and time and again our world has witnessed a drastic change, which has led to a significant change in the network of life on our Earth at different periods of time. If changes occur in the network as a whole, then the various nodes (species) change accordingly, to maintain the harmony of the network of life. The fossil record only gives a hint of those changes. Evolutionary psychology (EP) cannot unify the social and natural sciences because it does not have any real scientific foundation (it cannot satisfy the rigorous demands of experimental evolutionary biology), which can establish the origin and evolution of psychology. Much of what is speculated in EP about the biology and behavior of our so called ancestors is merely based on the study of a collection of fossilized bones. Thus the highly ambitious and extremely ill founded EP is entirely based on a wishful reflection from extremely limited data. From a pure scientific perspective one can question the usefulness of such claims of EP, and the burden of proof lies with the proponents and successive followers of EP to show its persuasiveness. Moreover, the theoretical reduction (evolutionary biology -> EP) that some scientists seem to adhere to also needs a scientific justification. From the perspective of ontological reduction they also need to realize that the modules of EP are not particularly compatible to the methods of evolutionary genetic biology. This is because EP is focused on (inherited) mental modules as its smallest unit of analysis, which states nothing about evolutionary biology's (inherited) smallest units (say, individual genes/neurons) or, at a larger scale, networks of gene/neurons, that are presumed to be involved in the physiological processes of cognition. The modern scientific approach cannot avoid abstraction because being limited in our abilities we cannot take into account the immense varieties of shapes, structures and phenomena that we observe in the world. Scientists in their attempt to understand reality try to measure, quantify, classify and analyze things. However, we all know that such a method is not applicable to things like subjective qualities (happiness, love, affection, anger and so on) that every scientist experiences. Ignoring all of that scientists keep on maintaining an endless hope that they can indeed intellectually map the reality in which things are reduced to their general outlines. Thus, throughout the history of modern science, scientists have only adopted an endless trial and error methodology where, with the progress of time, one opinion is being replaced by another. With an arrogant mindset, the majority of scientists somehow tend to imagine their concepts and symbols as reality itself. In the Vedic tradition such an approach is termed as *avidyā* (nescience) or illusionary (*māyā*), where deluded souls tend to confuse the false representation of reality and reality itself. However, it is not that difficult for a thoughtful and humble scientist to conceive the clear limitations or incompleteness of such a defective approach. Therefore, Vedic tradition gives much emphasis on a very different process by which one can awaken into a spiritual realm, which is beyond the reach of mere material senses (*indriya*), mind (*manasā*) and intelligence (*buddhi*). An individual can properly conduct experiments in modern subatomic physics only when he has undergone substantial training for several years under experts. Similarly, according to Bhagavat Vedānta, one can awaken his consciousness into a spiritual plane by taking up proper *Sādhu-Saṅga* (association of spiritually awakened souls) and *Bhajana-Kriyā* (carrying out the spiritual activities under the discipline of Sadhus – spiritually awakened souls). The basic aim of this process is to help the practitioner overcome the exploitative mentality (*bhoga*: the actions of the individual meant for the pleasure of material *indriya*: senses, *manasā*: mind, *buddhi*: intellect and *ahaṅkāra*: false ego) and help establish the practitioner in the platform of dedication (*bhakti*: the actions that are intended to satisfy the senses of Supreme Cognizant Being or *Bhagavān*). It must be noted that this process is completely different from the path of dry renunciation (*tyāg*) that a few *jñānīs* and *yogīs* adopt, where they merely attempt to block sensual and mental temptations by abstract meditation and other methods. In the Vedic tradition there are two types of educational systems (which were practiced in ancient eastern educational schools – *gurukula*): (1) *aparā-vidyā* (material knowledge) and (2) *parā-vidyā* (transcendental knowledge). The verse 1.1.4-5 of *Muṇḍaka Upaniṣad* explains: *dve vidye veditavya iti, ha sma yad brahma-vido vadanti — parā caivāparā ca. tatrāparā ṛg-vedo yajur-vedaḥ sāma-vedo 'tharva-vedaḥ śikṣā kalpo vyākaraṇaṁ niruktaṁ chando jyotiṣam iti. atha parā yayā tad akṣaram adhigamyate*.

Translation: There are two kinds of educational systems. One deals with transcendental knowledge [*parā vidyā*] and the other with material knowledge [*aparā vidyā*]. All the Vedas — the *Ṛg Veda*, *Yajur Veda*, *Sāma Veda* and *Atharva Veda*, along with their corollaries, known as

śikṣā, *kalpa*, *vyākaraṇa*, *nirukta*, *chanda* and *jyotiṣa* — belong to the inferior system of material knowledge [*aparā vidyā*]. By *parā vidyā* one can understand the *akṣara* — Brahman or the Absolute Truth. In the Vedic tradition *Vedānta-sūtra* is accepted as the *parā vidyā* and *Śrīmad-Bhāgavatam* is considered as a natural supplementary commentary on the *Vedānta-sūtra* (*parā vidyā*). *Śrīmad-Bhāgavatam* deals with this subject matter much more elaborately. Vedāntic philosophy goes much beyond the material realm (beyond both *sthūla dravya* – gross matter and *sūkṣma dravya* – subtle matter) to explore the world of spirit. On the other hand, modern scientific knowledge is only centred around gross matter and that type of superficial knowledge cannot help us to attain the inner hankering towards fulfillment and attainment of the ultimate goal of life. The process of knowledge gaining adopted by modern science comes under yet another category *avidyā* (nescience) and we have to realize that our capacity to know reality substantially by our own ability alone (without any authentic hints) is very meager. With a false conception of "self", the 'hedonic perspective' based technological advances in modern science forces us to embrace an exploitative position by completely ignoring the long-term consequences. The dangerous effects of this are in front of us in the form of environmental problems, degraded food quality, increased suicide rates, atomic and biological weapons, and so on. Thus, in the Vedic tradition such an approach is termed as *avidyā* (nescience) or illusionary (*māyā*).

The Concept of Organic Whole from Bhagavat Vedānta: According to Bhagavat Vedānta sentient nature (life) and insentient nature (matter) are seen as a manifestation of marginal (*taṭasthā śakti*) and external energies (*bahiraṅgā śakti*) respectively of the same Supreme Cognizant Being or Bhagavān. As the verse 6.7.61 in *Viṣṇu Purāṇa* explains:

viṣṇu-śaktiḥ parā proktā kṣetra-jñākhyā tathā parā
avidyā-karma-saṁjñānyā tṛtīyā śaktir iṣyate

Translation: The internal potency of the Supreme Lord, Viṣṇu, is spiritual, as verified by the *śāstras*. There is another spiritual potency, known as *kṣetra-jña*, or the living entity. The third potency, which is known as nescience (*avidyā-karma*), makes the living entity godless and fills him with fruitive activity. Thus according to Bhagavat Vedānta, to transcend the plane of matter, which forces us to experience the dual nature *sukha* (pleasure) and *dukha* (pain), we should properly understand the three potencies of the absolute (1) internal potency (*yoga-māyā*), (2) marginal potency (*kṣetra-jña*, *jīva-ātma* or spirit soul) and (3) external potency (*mahā-māyā* or *avidyā-karma*) that are explained in the above verse. In the material conception of life the living entities have the propensity to misconceive the reality in isolation from Bhagavān and thus by falsely imitating (such false conception of self is known as false ego) the real position of Bhagavan as supreme proprietor of everything, such deluded living entities try to display their false dominance over reality. Under the direction of Bhagavān the external energy (which is also known as *mahāmāyā*) facilitates the illusory atmosphere where the illusioned living entities can exercise their isolated ego or false ego. Modern egocentric materialistic science has taken an extremely simplistic route with a thoughtless presumption that we can know everything by our own ability by conducting some scientific research programs. This framework only emphasizes the "false ego". Thus practitioners of this type of approach continually put forward one after another their own mental speculations (models and theories) and often adhere to a dogmatic stand to support their mental speculations that arrogantly reject the logical conclusions. This is clearly evident in origin of life research works. According to Vedānta philosophy an "organic whole" (*pūrna*) comes from an "organic whole" ('Life comes from Life' or 'every cell comes from a cell' – biogenesis), and an "organic whole" (*pūrna*) cannot come from the mechanical and chemical additive sum of the parts (*khaṇḍa*). Proponents of the material origin of life completely ignore this empirically observable fact and the logical conclusion that follows (first life, which religion calls God, is the original source of all life forms). It is empirically observable that 'Every day the Sun rises in the East' and hence it is logical to conclude that the 'First Sun rise was in the East'. There is no problem, if someone wants to dedicate his/her whole life to do a rigorous scientific research to prove the opposite–'First Sun rise was in the West' (or, life originated from matter). But problems arise when keeping such illogical views in mind when someone wants to critique those who have the conviction on the obvious – 'First Sun rise was in the East' (or, sentient life is primitive and reproductive of itself – *omne vivum ex vivo* – life comes from life). Bhagavat Vedānta emphasizes that such an egocentric approach can never enlighten us about the true nature of reality due to its clear limitations. Whatever comes from our mental speculation or 'guess work' is only a misconceived view of reality and it can never be successful in comprehending the reality, which is an 'organic whole'. According to the Bhagavat Vedāntic view one takes such an arrogant position (that we can know everything by our own ability and by conducting some scientific research programs) only when his/her intelligence is completely stolen by the deluding potency (*māyā*) of the Supreme Absolute Lord Hari (Bhagavān). Molecular biology cannot explain how a new born chick knows what to eat and what not to eat. We also do not

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know how great scientists all of a sudden get some good ideas to solve the puzzles that they were working for a very long time. We have no idea about the source of that knowledge and also we do not know the proper process to get connected to that source. However, Bhagavat Vedānta deals with this subject in depth. But to become a student of Bhagavat Vedānta one has to give up the egocentric stand and one needs to develop a quality of submissive hearing from the self realized saints in a bona fide guru-parampara. Thus, according to Bhagavat Vedānta there are two options available for the spirit soul: (1) an endless speculation (we want to explain reality with our endless speculative models and theories) or (2) a systematic approach towards understanding the true nature of Reality (the top-down revealed knowledge, which is tested successfully by many great personalities like Lord Brahmā, Śrī Nārada Muni, Śrī Vyāsadeva and so on). An animal will not bother so much about what is higher knowledge and what is lower knowledge because an animal only wants that much knowledge which is enough to satisfy its immediate biological needs. However, it is only in human society where we can see the systematic inquiry which goes beyond the bodily plane, thus there are various religions and philosophical approaches that guide different individuals to understand the subtle topics like intelligence, knowledge, reason, consciousness, soul, God, happiness/fulfillment and so on. A human may live a life of an animal by maintaining all his/her attention towards the mere immediate biological needs only. A child who has undergone a developmental process, which is completely devoid of behavioral-developmental training, will only behave like an animal. However, there is also a possibility that a human being who has received proper training may also develop some systematic inquiries which go much beyond the immediate biological needs. Therefore, to know, what is higher knowledge and what is lower knowledge, one also needs proper training and education. According to Bhagavat Vedānta different bodies create different kinds of conditioning for spirit souls who are having different degrees of false ego and thus we see the expression of free will at different degrees in different organisms. According to Bhagavat Vedāntic philosophy different spirit souls may be present in different bodies, and due to the limitations as a result of conditioning of those bodies the spirit souls (despite having same abilities in potential form) cannot manifest their full potential. In modern society the notion that 'we are all of utmost significance' finds its prominence because we receive such teachings in our educational system and especially it is much more emphasized in the scientific studies. Our modern educational system does not encourage us to properly analyze our true constitutional position. However, in Vedāntic schools this is the first step towards our real enlightenment. If we try to sincerely analyze our true position then we can realize that in every aspect we are dependent beings. We need help in so many directions even to maintain our own body. We even do not know how a tiny cell functions so perfectly and yet, despite our ignorance about the functioning of cell, so many cells in our bodies are working magically to keep us alive. The curricula in scientific education only emphasizes how great science is and there is negligible or no emphasis on the limits of modern empirical science. Using torchlight on a dark night we can see things but that seeing is only within a certain range. Therefore, what we see under the torchlight is only an insignificant portion and if we do not acknowledge this fact then that will be a mistake. Similarly, we can only understand an insignificant portion of reality by the use of empirical science. However, reality is much more complex and is much beyond the scope of overly simplistic egocentric empirical science. We can easily realize our insignificant position, when we properly understand and rationally discuss the real limitations of the grand scientific enterprise. The prominent reductionist approach in modern science only emphasizes that we must subdue nature, penetrate its secrets and chain it to satisfy our desires. Modern science has cultivated this attitude in society at large (we are all of utmost significance) and the result of such an egocentric attitude has already created havoc in our environment. Most importantly, despite our false ego that "we are all of utmost significance" we have moved towards such a dangerous environmental deterioration that it is irreparable by scientific technology alone. On the other hand, Bhagavat Vedāntic wisdom teaches that reality is an organic whole and we are only insignificant, subservient beings of the centre of that whole. A cell is a whole and all the biomolecules of the cell are meant to serve the cell as a whole. All the cells in our body are meant to serve the body as a whole. So by nature all the cells are subservient to the body as a whole. If individual cells try to maintain their own significance apart from the whole then that will create an unhealthy condition (say, cancer) in our body and it will also create a condition of self destruction to those cells. By serving the body as a whole, all those cells are automatically maintained. Similarly, we are insignificant subservient participants of the original organic whole. By misconceiving our true constitutional position we are trying to display our individual significance by completely forgetting our true relation with the original organic whole, and that is the real cause of suffering condition that we have created in our society. Bhagavat Vedānta explains that all sprit souls are endowed with free will and we can only find gross matter by completely eliminating that free will. Thus, to

have a progress from bondage (living with a false conception of self apart from Bhagavān) to liberation (overcoming the false notion of self by realizing the true self as an eternal servant of Bhagavān) the spirit souls require freedom to exercise their independence. A few fortunate spirit souls by the good association of saints (who are already established in their true constitutional position) can realize that exploitation is opposite of their true nature, and thus try to progress towards their true nature as eternal servants of Bhagavān. According to the Vedāntic view matter is a symbol of undeveloped consciousness. Conditioned living entities (living entities with material consciousness/conception) try to understand and dominate matter by sensual means – *pañca-tanmâtra*. Here the word *mâtra* (matter) is coming from the same root word *māyā* (the limiting or measuring potency). Being proud of their sensuous activities those living entities who want to take a rebellious stand against the supremacy of Supreme Absolute (Sri Krishna), the deluding energy of Supreme Absolute *mahā-māyā* or *avidyā-karma* (external potency) prevents them accessing the realm beyond the material plane. However, by taking a proper association (Sadhu Sanga) of those elevated souls who have pure consciousness (those who are under the influence of the internal potency of the absolute – *yoga-māyā*) the conditioned souls can also develop pure consciousness and thus gain the access to the absolute realm by developing the spirit of dedication or devotion. This subject is explained in much more elaborate and detailed manner in *Śrīmad-Bhāgavatam* and other Vedāntic literature (*parā vidyā*). Our true self (real ego) or the soul proper (*ātman*) is much beyond the mundane mind (*manasā*) and intelligence (*buddhi*). According to Vedānta, the soul (*ātman*) possesses the qualities of *sat*, *cit* and *ānanda*. All life exhibits these same qualities. Every living organism wants to maintain its life forever (*sat*) and is willing to engage in the struggle for existence until it is forced by the laws of material nature to succumb to physical death of the body. The fact that life goes on generation after generation for thousands or millions of years is not something we would expect in chemical or physical material processes. It is sentient or conscious (*cit*) and seeks knowledge in the human form. And all life seeks fulfillment (*ānanda*) through nutrition, and various other forms according to the spiritual development of the various qualities of the soul (*ātman*) within the different bodies. Vedānta explains that beyond our individual existence (*sat*), knowledge (*cit*) and fulfillment (*ānanda*) there is a world of spirit and that is our real place of residence. According to Vedānta, we obtain our individual conscious substance (or being) from Ultimate Reality, Bhagavān Sri Krishna, Who is the personification of these three features existence (*sat*), knowledge (*cit*) and fulfillment (*ānanda* – ecstasy). The first verse of *Śrīmad-Bhāgavatam* elaborates the commentary of the second aphorism of *Vedānta-sūtra* (*janmādy yato ńvayād itarataś cārthesv abhijñah svarāt*). "*Janmādy asya yatah*" – the origin of everything is "*abhijñah svarāt*" – the Supreme Cognizant Being. The verse 5.1 in *Sri Brahma Samhita* also explains:

īśvaraḥ paramaḥ kṛṣṇaḥ sach-chid-ānanda-vigrahaḥ
anādir ādir govindaḥ sarva-kāraṇa-kāraṇam

Translation: The personification of spiritual existence, consciousness and ecstasy, Sri Krishna, who is known as Govinda, is the Supreme Lord of all Lords. He has no origin, He is the origin of all and He is the cause of all causes. Thus, Bhagavat Vedānta advocates that we are living in an 'Organic Whole' and every individual unit of this whole is meant to dedicate itself for the satisfaction of the Centre – the *ādi-puruṣa* or primeval personal Absolute. Sri Chaitanya Mahaprabhu (*Śrī Caitanya-caritāmṛta Madhya-līlā* 20.108-109) also gave the same teaching:

jīvera 'svarūpa' haya — kṛṣṇera 'nitya-dāsa'
kṛṣṇera 'taṭasthā-śakti' 'bhedābheda-prakāśa'
sūryāṁśa-kiraṇa, yaiche agni-jvālā-caya
svābhāvika kṛṣṇera tina-prakāra 'śakti' haya

Translation: It is the living entity's constitutional position to be an eternal servant of Krishna because he is the marginal energy of Krishna and a manifestation simultaneously one with and different from the Lord, like a molecular particle of sunshine or fire. Krishna has three varieties of energy. Therefore, we can attain a real goal of life only when we can establish ourselves in our true constitutional position as eternal servants of the primeval, personal Absolute. However, the living entities who are ignorant about their true constitutional position, exercise their freedom to choose a position against their real nature. Ignoring their true position as eternal servants of Sri Krishna these living entities can develop the moods of either active (exploitation) or passive (renunciation) hostilities towards the Supreme Absolute Sri Krishna (the centre of the original organic whole), and proceed along the paths of *karma* or *jñāna*/*yoga* respectively. In that mood of hostility towards the Supreme Absolute these living entities cannot attain peace and obviously fulfillment is much beyond their reach. According to *parā vidyā* both salvationists (those who call themselves *vaidāntika* and aspire for false liberation, *mukti* or *mokṣa*) and elevationists [those who aspire to improve religion (dharma or duty), economic development (*artha*) and sense gratification (*kāma*)] are considered exploiters. Elevationists try to exploit in a gross plane and salvationists do the same on a subtle plane. Therefore, these *catur-varga* (1) *dharma*, (2) *artha*, (3) *kāma* and (4) *mokṣa* are the system of inferior material knowledge

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(*aparā-vidyā*). The literature which does not have anything to do with the materialistic way of life and informs us about transcendental knowledge (spiritual world, spiritual life, spiritual identity and the spirit soul) is called *parā vidyā*. Therefore, *karmīs*, *jñānīs* and *yogīs* cannot provide us *parā vidyā*. One can receive the pure message of *Śrīmad-Bhāgavatam* only from pure devotees (*Vaiṣṇavas*). This was also instructed by Lord Sri Caitanya Mahaprabhu to Srila Rupa Gosvami (*Śrī Caitanya-caritāmṛta Madhya-līlā* 19.149):

kṛṣṇa-bhakta — niṣkāma, ataeva 'śānta'
bhukti-mukti-siddhi-kāmī — sakali 'aśānta'

Translation: Because a devotee of Lord Krishna is desireless, he is peaceful. Fruitive workers (*karmīs*) desire material enjoyment, *jñānīs* desire liberation, and *yogīs* desire material opulence; therefore they are all lusty and cannot be peaceful. Thus, Bhagavat Vedāntic philosophy talks about three levels of consciousness: (1) *bhoga* (exploitation), (2) *tyāg* (renunciation) and (3) *bhakti* (dedication). There are also different particular levels of consciousness for each of these three general levels of consciousness. The material universe in which we are living at present is nothing but the realm of *sthūla dravya* (gross matter) and *sūkṣma dravya* (subtle matter). The world of matter is dominated by the consciousness of exploitation (*bhoga* – 'freedom for the senses'/'endless sense gratification') and thus the activities of living entities are driven by 'laws of karma – laws of action and reaction', which is an unnatural position for the living entities because spontaneous activity is the true nature of life. When the living entities are tired or feel distressed due to endless entanglement of the karmic cycle, they try to find some form of relief/liberation from that suffering position by making the attempts to eliminate consciousness itself – renunciation (*tyāg* – the attempt to block sensual and mental temptations). However, renunciation (withdrawal) cannot be a true remedy, as we all know retirement is fraught with great difficulties. There are a few liberationists who think that renunciation is the solution for overcoming the suffering condition from the reactionary plane of exploitation, and they externally try to leave everything and advise others to do so. However, stopping all the activities (returning to zero) is undesirable and is against the real nature of the living entity. During the great *Mahābhārata* war Arjuna also wanted to follow this path of renunciation (he wanted to leave everything and wanted to go to the forest) when he was in extremely distressed condition. Bhagavān Sri Krishna in *Śrīmad Bhagavad-gīta* informs us through Arjuna that there is yet another much higher level of consciousness – dedicating consciousness (*bhakti* – 'freedom from the senses'/'process of engaging senses in the loving service of the centre'). The realm where every unit is a dedicating unit towards the centre is known as the land of dedication, which begins with *Vaikuṇṭha* (*vai* mean without and *kuṇṭha* means limit; *Vaikuṇṭha* means unlimited) and ends in *Goloka Vṛndāvana* (the sphere of pure fulfillment – *ānanda*). Under the proper guidance of a *Vaiṣṇava* teacher an individual can realize and even find entrance to the world in which the spiritual beings reside (the plane of dedication). By the attainment of a real home beyond the transient material existence (the plane of exploitation and renunciation) one can attain 'home comfort'[1].

CONCLUSIONS

Biologists invoke superstition about the creative power of mutation to justify their claim that all the different organs and all biological forms evolved from an inorganic simple matter. Bhagavat Vedāntic philosophy challenges the objective evolution of bodies and the superstitious belief about the creative power of mutation. Bhagavat Vedāntic philosophy proposes that life displays a mystical, wholistic, organic developmental process (the process that produces: different complex biomolecules in a cell, a cell from another cell and the whole body from a single cell zygote) which can indeed create all these inconceivable organs and living forms. The complex biomolecules that we find in cells are not an outcome of mutation of simple inorganic matter and the same is true for cells, different organs and living forms. We are empirically witnessing that the complex biomolecules, living cells, different organs and living forms, all manifest by the mystical, wholistic, organic developmental process. Why do biologists or anyone ignore this empirically verifiable fact and invoke some superstitions about the creative power of mutations. In principle, true science is meant to decide whether what we choose to believe has a basis in the laws of nature or not. Anybody can claim anything on the name of science but to call it a scientific faith one must also provide the valid scientific justifications for that belief. The belief that "Life came from Matter – Abiogenesis" is against the laws of nature "Life comes from Life – Biogenesis". The belief that mutations create complex biomolecules, living cells, different organs and living forms, is against the laws of nature because all living forms and their bodily stuff appear from a mystical, wholistic, organic developmental process. Taking an unbiased stand one can easily apply proper scientific reason to judge which among two explanations have the plausibility, consistency and explanatory power. Even though the seed of modern science can be traced back to the ancient Greek philosophy, in modern times empirical sciences have superficially tried to follow a process of independence from philosophy which has never been achieved. Science

cannot be independent of philosophy because scientific method itself is hermeneutically conditioned, and its dependence on philosophy becomes more apparent when one reflects upon the teleologically conditioned aim of modern science. Both hermeneutical and teleological conditionings come from a particular tradition. Scientists simply presume that they can arrive at truth because they erect their conclusions on data they obtain through sensory perception. On the basis of this premise scientists criticize different subtle philosophical and religious claims because they strongly believe that their information originates from real rather than imaginary things. This conviction of scientists is inherently based on another implicit presupposition that real things are only those that can be accessed through gross sensory perception assisted by technological advancement. This adherence of scientific epistemology to empirical (Greek word *empeiria* means experience) conditioning in turn comes from teleological and hermeneutical conditionings. The entire scientific enterprise is based on scientists' implicit presupposition of what real means and the ideas come into science from the side of the hermeneutical conditions of scientific methodology. Scientists will agree that they obtain information from two sources. The suggestions of previous studies help a new scientific research to identify a problem and a new scientific research cannot initiate itself by remaining completely independent of previous studies. This indicates that the progress of science is dependent on both empirical data and the suggestions of previous scientists. Thus scientific research is conditioned by both tradition and testing. Moreover, the ultimate goal (teleological conditioning) of modern science is to build a cosmology (an all comprehensive worldview) and this is exactly the goal of metaphysics and ontology that philosophy and religion try to address. Therefore, the difference between science, philosophy and religion is one of method rather than aim. This common goal of science, philosophy and religion must be kept in mind when one deals with the questions on consciousness, origin of life, matter, biodiversity and the universe. In the course of time, a myth of scientific rationality was developed from a continual uneasy atmosphere and the conflicts between Western science and religion, where scientists have started claiming that their scientific methods can produce the absolute universal truth about reality, which religion and traditional philosophy cannot produce. However, in recent times scientists have gradually started to realize that the scientific method can only produce partial approximations and that scientific method is incapable of producing any absolute, infallible truth. The progress of science is helping us realize that by utilizing scientific methods scientists can only proceed for ever to erect increasingly a so called truer rebuilding of reality, which is in fact problematic and improvable. As Mario Bunge concludes: "Hence, science cannot have an ultimate goal, such as building a complete and flawless cosmology. The goal of science is rather the ceaseless perfecting of its chief products (theories) and means (techniques), as well as the subjection of more and more territory to its sway."[1] Scientists dealing with studies on consciousness, origin of life, origin of matter (the majority of scientists simply presume that matter is primitive), origin of biodiversity, origin of the universe and so on, should first recognize the need to consider the content and scope of science. The goal (teleological conditioning) of science demands that scientists must test their hypotheses with empirical sources of information. Empirical science can only be applied to any theory that can be tested empirically. The study of origin (of life, matter, biodiversity and universe) and the subtle subjects like mind, consciousness, soul, God, fulfillment and so on, is beyond the scope of the limited methodology that modern science has adopted. Moreover, being influenced by scientific tradition, in science the conception, formulation, and advancement of hypotheses take place a priori and then scientists try to prove/disprove hypotheses by empirical testing. Previous scientific teaching helps scientists construct their hypotheses. Thus the work of scientists is not solely a product of facts produced by nature but is also influenced by human reason. If we carefully analyze this scientific method then it appears that science takes place within an orthodox tradition and this tradition subsumes (hermeneutical conditioning) all that scientists bring to the scientific method. Conditioned by this orthodox tradition scientists simply presume that things or events that can be observed in space and time exist and can be taken as evidence on which to build scientific knowledge. This orthodox tradition also bestows a primary revelatory status to natural phenomena and in this tradition historical phenomena only play an assisting role in the revelatory process. Thus, scientists use testing hypotheses as the ultimate ground of scientific truth and it renders the best results only when applied to the recurring cycles of nature. This orthodox tradition also does not allow scientists to build their views on the basis of any divine revelation (scriptures) and thus scientific studies do not include any topics on the soul, God and the eternal constitutional relationship between souls and God (devotion). On the other hand, all bona fide religions are based on divine revelation (Scriptures) and Scriptures reveal that both material (things or events within material space and time) and spiritual (reality beyond material space and time) realms exist. We observe the greatest incongruity between religion and modern science because being influenced by orthodox tradition scientists embrace

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empiricist foundationalism, and thus in science the divine revelation (Scriptures) is plainly rejected as mere fantasy. Being conditioned by orthodox tradition, the majority of scientists never seriously doubt the foundationalist role conferred in science to empirical testing. On the other hand, even an elementary education in religious tradition helps individuals to clearly understand the limits of empiricist foundationalism. Thus, scientists have no rational justification to dismiss the wisdom of Scriptures because the methods of religion and modern science appear to be mutually exclusive of one another. It is irrational to teach different things in a doctrinaire manner to innocent students and such a practice damages individuals' real spirit of inquiry. Unfortunately, modern education follows this irrational path, where the materialistic views of reality are taught to the innocent students in a doctrinaire manner. Modern education does not provide any scope to introduce spiritual concepts and theistic views of reality. Vedānta advocates that under the guidance of a spiritually realized being, we must inquire into our true nature: *athāto brahma jijñāsā*. A genuine spiritually realized saint does not introduce anything in a doctrinaire manner. In the Vedic tradition sages only try to awaken the proper inquiring spirit (*jijñāsā*) in the students and there is a whole system that they follow to help the individuals overcome the plane of ignorance. Modern science should not display a dismissive attitude for this practice because it is also a valid way of gaining real knowledge about reality. This helps the practitioner to establish one's own constitutional position as a serving member of the abode of Supreme Absolute. If scientists think that they have some specialized (authority) knowledge and they can give it to others, then they cannot display a dismissive attitude towards the fact that different, genuine religious saints can also have some specialized realization which they can impart to the sincere seekers. In modern science, the majority of scientific effort is only focused around the ideology "life originated from matter", which is only an unverified ideological presupposition that has no scientific or observation-based evidence to support it. What is the need to spend our whole efforts to find evidence for this unfeasible event? At present study of matter is the central interest of whole scientific enterprise. However, scientific studies should not be restricted to a mere understanding of impersonal mechanistic processes, which has nothing to do with life. As we all are living beings, life is a more important subject for scientific understanding than matter.

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17. Refer: http://www.rsc.org/Education/Teachers/Resources/cfb/Photosynthesis.htm
18. The intensity of two sources of light at some other place is not necessarily found as mere a sum of intensity of two lights coming from two sources. Rather, what is observed is that like the behaviour of waves emanating from two sources the net intensity is either greater or lesser than the straight forward sum of two. Like, interference phenomena of the waves emanating from the two sources, in the case of two light sources, when two crests coincide we can see more light and when a crest and a trough coincide we see less light. Electromagnetic radiation exhibits this type of interference phenomena.

Source of Support: None Declared
Conflict of Interest: None Declared

International Journal of Recent Trends in Science And Technology, P-ISSN 2277-2812 E-ISSN 2249-8109
Special Issue, ACAEE: 2018 pp 311-329

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