



## Talk 2: Limits of Chemical Analysis of Life – Vedic View can Serve as Alternative Shilpi Saxena, Ph.D.

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### 1.0 Introduction

There are a great many scientists with intriguing ideas that explain how life may have originated on earth, but there is very little that we know for sure. New hypotheses are being proposed constantly, and old ones re-evaluated. Thus, the contesting ideas are presented in this paper in an open-ended format, attempting to make clear that there is as yet no one answers to the question of how life originated on earth. The origin of life seems to have taken just the right combination of physical events and chemical analysis.

The dominating scientific paradigm for the chemical origin of life was derived over 70 years ago at a time when the popular cosmology held that the universe, and essentially the earth itself, were infinitely old [15] Those trying to explain life in purely naturalistic terms liked having an infinite universe, for it made irrelevant any high improbabilities associated with the natural origin of life. As Hubert Yockey states, "even if life proves to be improbable, it will happen in such an infinite universe [15]. In other words, given infinite time, infinite things are possible. Darwin first conceived of the origin of life happening in some "warm little pond" with ammonia, and sulfates, and electrical charges [16]. Surprisingly, the modern paradigm isn't all that different. These ideas influenced Aleksander Oparin and JBS Haldane who in the 1920's postulated that life formed as a result of "chemical evolution," where natural reactions between the chemicals present on the early earth eventually formed life. It was soon realized that the infinite universe was little more than wishful thinking. Einstein's general theory of relativity predicted that the universe must expand or contract if it contains any matter [15].

Thus, the universe must be finite both in size and age; not only did the universe have a beginning, but time is limited. Many cosmologists opposed these ideas because they wanted an infinite universe where life's natural origin wasn't improbable. Yockey notes that "In spite of other successes of the general theory of relativity, the Big Bang, and in particular the idea that the universe had a beginning, was fought bitterly every step of the way." [4] Eventually the math and a slew of astrophysical data wouldn't have it, and science accepted the finite, time-limited universe. Thus says the "Big Bang" theory: "time is limited". And thus says mathematics, chemistry, and physics: "the natural chemical origin of life is highly improbable."

### 2.0 Theories about the Origin of Life

The question of how life originated is not easy to answer because it is impossible to go back in time and observe life's beginnings; nor are there any witnesses. There is testimony in the rocks of the earth, but it is not easily read, and often it is silent on issues crying out for answers. There are, in principle, at least three possibilities:

**2.1. Extraterrestrial origin:** Life may not have originated on earth at all; instead, life may have infected earth from some other planet.

**2.2. Spontaneous origin:** Life may have evolved from inanimate matter, as associations among molecules became more and more complex.

**2.3. Vedic View (Special Creation):** Life-forms may have been put on earth by supernatural or divine power.

#### 2.1 Extraterrestrial Origin:

Most atoms on Earth came from the interstellar dust and gas from which the Sun and Solar System formed. However, in the space science community, "extraterrestrial materials" generally refers to objects now on Earth that were solidified prior to arriving on Earth. In October 2011, scientist reported that one form of extraterrestrial material, cosmic dust, contains complex organic matter ("amorphous organic solids with a mixed aromatic-aliphatic structure") that could be created naturally, and rapidly, by stars [17,18,19]. In February 2014 NASA announced a greatly upgraded database for taking polycyclic aromatic hydrocarbons (PAHs) in the universe. According to scientists, more than 20% of the carbon in the universe may be associated with PAHs, possible starting materials for the formation of life. PAHs seem to have been formed shortly after the Big Bang, are widespread throughout the universe, and are associated with new stars and exoplanets [20].

## Recent Discovery of NASA

May 28, 2015 NASA Telescopes Set Limits on Space time Quantum Foam

May 5, 2015 Astronomers Set a New Galaxy Distance Record (EGSzs81)

February 5, 2015 Planck Mission Explores the History of Our Universe

January 30, 2015 Gravitational Waves Remain Elusive

October 15, 2014 Slow Growing Galaxies Offer Window into Early Universe

May 6, 2014 Planck Takes Magnetic Fingerprint of Our Galaxy

The theory of **panspermia** proposes that meteors or cosmic dust may have carried significant amounts of complex organic molecules to earth, kicking off the evolution of life. Hundreds of thousands of meteorites and comets are known to have slammed into the early earth, and recent findings suggest that at least some may have carried organic materials. Nor is life on other planets ruled out. For example, the discovery of liquid water under the surface of Jupiter's ice-shrouded moon Europa and suggestions of fossils in rocks from Mars lend some credence to this idea. The hypothesis that an early source of carbonaceous materials extra-terrestrial is testable, although it has not yet been proven. Indeed, NASA is planning to land on Europa, drill through the surface, and send a probe down to see if there is life.

## 2.2 Spontaneous Origin

According to the Chemical and physical process, if we were to look at the Universe one second after the Big Bang, what we would see is a 10billion degree sea of neutrons, protons, electrons, antielectrons (positrons), photons, and neutrinos. Then, as time went on, we would see the Universe cool, the neutrons either decaying into protons and electrons or combining with protons to make deuterium (an isotope of hydrogen). As it continued to cool, it would eventually reach the temperature where electrons combined with nuclei to form neutral atoms. Before this "recombination" occurred, the Universe would have been opaque because the free electrons would have caused light (photons) to scatter the way sunlight scatters from the water droplets in clouds. But when the free electrons were absorbed to form neutral atoms, the Universe suddenly became transparent. Those same photons the afterglow of the Big Bang known as cosmic background radiation can be observed today.

Most scientists tentatively accept the theory of spontaneous origin that life evolved from inanimate matter. In this view, the force leading to life was selection. As changes in molecules increased their stability and caused them to persist longer, these molecules could initiate more and more complex associations, culminating in the evolution of cells.

The basic idea behind the chemical origin of life is that simple molecules became more complex molecules which eventually allowed the first auto-catalytic self-reproducing molecule to exist. Many would define the chemical origin of life as the existence of a single molecule that was not only able to replicate on its own, but could produce any molecules necessary to facilitate that replication. According to Stanley Miller, famous origin of life researcher, the chain of events looked something like this [14].

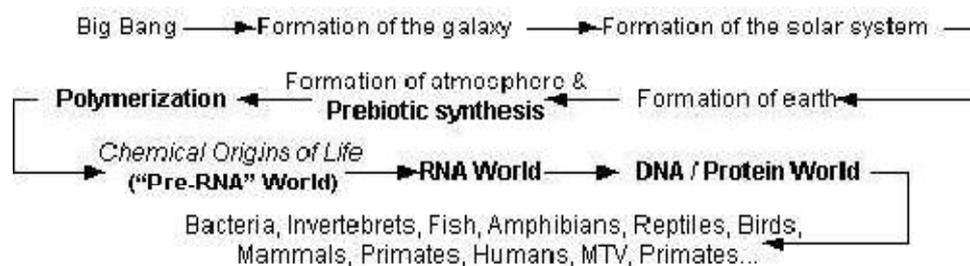


Figure 1. Chain of events of origin of life.

The touted sequence of events leading from a "random" explosion of matter and energy to DNA-based life. Please note, emboldened terms will be discussed in the text. Most origin of life researchers would generally agree with such a diagram, although some add "extraterrestrial input" in varying amounts somewhere along the line.

For example, Stanley Miller believes extraterrestrial input (i.e. comets, asteroids, and random dust particles) contributed about 5% of the pre-biotic organic molecules on earth [14].

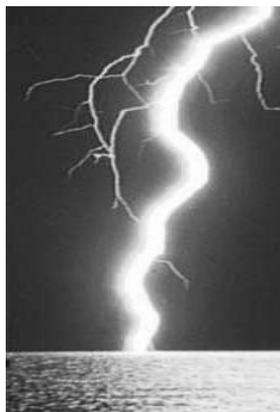


Fig.2 **Lightning**. Before life evolved, the simple molecules in the earth's atmosphere combined to form more complex molecules. The energy that drove these chemical reactions may have come from lightning and forms of geothermal energy.

### 2.2.1 Chemical Analysis of Life

When the bodies of living organisms are chemically analyzed, we find that they are primarily made up of four elements (H, O, N and C). Chemicals such as water, proteins, lipids, carbohydrates and nucleic acids constitute 95% of all the molecules present in the body of a living organism. Thus it is tempting to conclude that life could be a product of complex chemical reactions. Based on this concept, practically all research works about life's origin are focused on the possible synthesis of small and large molecules that make up the bodies of living organisms. But is DNA or RNA molecule life? Will a combination of synthetic biomolecules lead to life? If life is made of chemicals, what will be the difference between life and death? Do the scientists really study life?

#### (a) Is DNA Life?

According to modern biology, the smallest unit of life is called a cell. All living organisms have cells. Organisms such as bacteria and protozoa have single cells whereas higher living forms like human beings have billions of cells. Cells contain many simple, inorganic chemicals like water and inorganic ions. However, complex organic molecules such as proteins, RNA (Ribonucleic Acid), DNA (Deoxyribonucleic Acid), lipids, etc., provide for most of the essential biological functions of the cell.

### Miller's Experiment

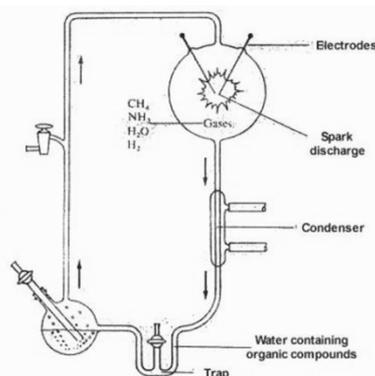


Figure. 2 Stanley Miller's spark experiment gave the first evidence for the primordial soup theory of life's origin.

Scientists, in the field of biology, study life and its origin in terms of these biomolecules. They attempt to generate a living cell by combining these biomolecules. Many biologists and evolutionary chemists – such as Oparin, Fox, Miller, Orgel, Ponnampertuma and many others made extensive experimentation to generate life from molecules. Various models have been proposed for understanding how life may have generated from chemicals on earth such as Oparin's model of coacervates, Fox's model of protenoid microspheres, Cairns

Smith's model of clay as our grandfather, Christian de Duve's thioester model, Miller's electrical discharge reactions to simulate lightening in a so-called primordial gaseous mixture of H<sub>2</sub>, H<sub>2</sub>O, NH<sub>3</sub>, CH<sub>4</sub>, etc., of the presumed primordial or early earth. It is interesting that Miller himself, one of the main pioneers of prebiotic chemistry, has recently stated, "We really don't know what the Earth was like three or four billion years ago. So there are all sorts of theories and speculations.

The major uncertainty concerns what the atmosphere was like. This is a major area of dispute." [2] It is beyond the scope of this paper to describe all these models here. However, the author would like to mention that all these models do not show any sign of generating a living cell till the present time.

**(b) "Which came first DNA or protein molecule?"**

In 1953, Watson and Crick proposed the double helix model for the structure of DNA. Their discovery helped to explain how genetic material is copied inside the cell genetic information flows from DNA, in the nucleus of each cell, to RNA, which carries the information out of the nucleus into the body of the cell and uses the instructions encoded in it to produce proteins (which acts as enzymes and also provide the structural framework of cells). However, the duplication of DNA requires numerous enzymes that catalyze those reactions. And enzymes are proteins themselves the end product of the information coded in DNA. In other words, proteins are required for DNA synthesis and DNA is required for protein synthesis. How then could the first living cell with DNA based molecular biology have originated by spontaneous chemical processes on the prebiotic earth? This has been the chicken and egg problem of life's evolution from chemicals "which came first DNA or protein molecule?"

**(c) *The RNA World***

In late 1960's several biologists including Crick, Carl Woese and Leslie Orgel [3] suggested that the ancestor molecule was neither DNA nor protein but RNA. RNA, they suggested, might have catalyzed reactions necessary for replication as well as providing the genetic information necessary to replicate itself. Self replicating RNA based systems would have arisen first, and DNA and proteins would have been added later. DNA could evolve from RNA and then, being more stable, take over RNA's role as the guardian of heredity.

This idea further got support in early 1980's from the independent discoveries of Thomas Cech and Sidney Altman of a kind of RNA that catalyzes a reaction. [4] These catalytic RNA molecules have subsequently been termed as "ribozymes". In 1986, Walter Gilbert, in an article in Nature, portrayed the primordial world as 'RNA World' where RNA molecules catalyze their own synthesis. [5] Since then, the term 'RNA World' has stuck to the general hypothesis RNA first, DNA and protein later and researchers continue to discover new functions for existing RNA, illustrating repeatedly how versatile these molecules can be.

However, there are many difficulties and problems in the RNA world. [6] Leslie Orgel, one of the scientists who first proposed it in the 1960s, himself concedes that researchers who have attempted to illustrate the possibility of spontaneous generation of the chemical elements of RNA itself have had only modest success. Ribose, the sugar that is part of the backbone of the RNA molecule, is difficult to create from hypothetical early earth conditions except in very small quantities. [7] Stanley Miller and his colleagues have also recently reported, "ribose and other sugars have surprisingly short half lives for decomposition at neutral pH, making it very unlikely that sugars were available as prebiotic reagents." [8]

RNA world assumes that in the primordial world, ribonucleotides spontaneously condense into polymers to form RNA molecules and RNA molecules once formed would have the catalytic activity to replicate itself, and a population of such self replicating molecules would arise. However, it is objected that even if RNA could have formed spontaneously, it would have been continuously degraded by spontaneous hydrolysis and other destructive processes operating on the primitive Earth. [9] Joyce and Orgel points out many detailed problems with these postulates of RNA world. [10] They finally suggest not to accept "the myth of a self replicating RNA molecule that arose *de novo* from a soup of random polynucleotides. Not only is such a notion unrealistic in light of our current understanding of prebiotic chemistry, but it should strain the credulity of even an optimist's view of RNA's catalytic potential." [11] Similarly, Francis Crick has expressed great doubt about the RNA world. He says, "At present, the gap from the primal "soup" to the first RNA system capable of natural selection looks forbiddingly wide." [12] Thus the chemical concept of life does not seem to be very promising.

### 2.3 Vedic View as an Alternative (Special Creation)

Vedanta is considered the most advanced form of scientific and theological treatise of spiritual and cultural heritage of India. Basic meaning of Vedanta is the Ultimate knowledge of Truth. Vedanta refer not only to *Vedantasutra* but also to all Vedic literature that describe the conclusion of the Vedas, specifically the *Srimad Bhagavad Gita*, the *Srimad Bhagavatam*, the *Upanishads*, etc.

According to the *Srimadbhagavatam*, the essence of ancient Vedic literatures, the alternative viewpoint of *Bhagavata* paradigm says that *Pradhan* (unmanifested primordial matter) is the sum total of all material elements. At the time of manifestation of the cosmic universe, *Mahat-tattva* is generated from *Pradhan* and from *mahat-tattva* the subtle energies called- *sattva* (goodness), *rajas* (passion), and *tamas* (ignorance) are generated. From these subtle materials manifestations, gross material manifestations such as quarks, electrons, atoms, molecules, the whole set of Mandeleev's periodic table of chemical elements, etc., became manifest. Thus physics and chemistry deal only with the science of matter; they cannot deal with the science of life or *atma*.

We shall see some direct implications of the alternative paradigm, once we have considered the fundamental nature of individual living beings. First of all, in the alternative view we are describing, matter and life are understood to be two distinct kinds of energy. Life is not an emergent product of material particles. The *Bhagavad-gita* (BG 7.4-5) refers to this as follows: "Earth, water, fire, air, ether, mind, intelligence and false ego-all together these eight comprise My (Supreme Lord) separated material energies. Beside these, O mighty-armed Arjuna, there is another, superior energy of mine, which comprises the living entities who are exploiting the resources of this material, inferior nature. According to *Srimad Bhagavad Gita* (Bg 9.5) and *Srimadbhagavatam* (2.9.35), and yet everything that is created does not rest in Me. Behold My mystic opulence! Although I am the maintainer of all living entities and although I am everywhere, I am not a part of this cosmic manifestation, for My Self is the very source of creation.

In *BG* (9.17), Supreme Lord Sri Krishna said, I am the father of this universe, the mother, the support, and the grandsire. I am the object of knowledge, the purifier and the syllable *Om*. I am also the *Rig*, the *Sama* and the *Yajur Vedas*. In *BG* (10.8), Supreme Lord Sri Krishna said, I am the source of all spiritual and material worlds. Everything emanates from me. The wise who know this perfectly engage in My devotional service and worship me with their hearts. Again Supreme Lord Sri Krishna (*Bg* 10.39), inform to human kind through Arjuna that O Arjuna, I am the generating seed of all existences. There is no being-moving or non-moving-that can exist without Me. In (*Bg* 11.32), Supreme Lord Sri Krishna said that, I am the great destroyer of the worlds. In (*Bg* 15.15) Sri Krishna said, I am seated in everyone's heart, and from Me come remembrance, knowledge and forgetfulness. By all the Vedas, I am to be known. Indeed, I am the compiler of Vedanta, and I am the knower of the Vedas.

According to *Sri Isopanisad mantra 1*, everything animate or inanimate that is within the universe controlled and owned by the Lord. According to *Aitereya Upanisad* (1.1.1-2), He (Supreme Lord) glanced over the material creation. He Created this entire material world. According to *Chandogya Upanisad* (3.14.1), Everything, both matter and spirit, is non-different from the Supreme personality of Godhead who is Supreme Brahman. *Chandogya Upanisad* (6.2.3), When the Supreme Lord wishes to become many He glances (and produces the material manifestation). According to *Taittiriya Upanisad* (3.1.1), The Supreme Absolute Truth is that from which everything is born. In the '*Katha Upanishada*', Yama tells Nachiketa (ka. 1.2.9): ***Naisa tarkena matirapaneya***, 'This *mati* or spiritual understanding cannot be attained by logical reasons. The truth of unity of '*atman*' cannot be realized by logic, argument, or by any such means.

In *Sri Brahma-samhita* (5.35), He is an undifferentiated entity as there is no distinction between potency and the possessor thereof. In His work of creation of millions of the worlds, His potency remains inseparable. All the Universes exist in Him and He is presented in His fullness in every one of the atoms that are scattered throughout the universe, at one and the same time. Such is the primordial Lord whom I adore.

According to *Vedantasutra*, *janmadyasya yatah*, (*VS.1.1.2*), The Brahman, Absolute Truth or Supreme God is that from whom ***Originate the Creation, Sustenance*** and ***dissolution*** of this Universe.

Since the beginning of time, Veda has plainly stated the obvious that has always been observed by every man, woman and child who ever lived. “*janmady asya yato*” — the origin of everything is “*abhijnah svarat*” — the independent Supreme Cognizant Being, as given in the very first text of *Bhagavat Purana* [4]. Consciousness, in other words, comes from consciousness. It does not come from unconscious matter, as materialism dogmatically avers without trace of even the slightest logical reasoning. Where there is cognition or consciousness, there is life. So life comes from life. This is the Vedic conclusion “*janmady asya yatah*” — the conclusion of *Vedanta-sutra* [5]. And it is scientific. This implies that whatever contradicts such conclusion must be unscientific, based purely on dogmatic ideology, or misguided ideology.

Now comes the study of the nature of ultimate reality, the self in us and the self of this projected universe, the Primordial stuff and nature of cosmic evolution proceeding from it (*Brhadaranyaka Upanishad 1.4.7*). India has always emphasized knowledge of the conscious self or *atma*. *Vedanta-sutra* begins with the aphorism “*athatho brahma jijnasa*” — now, therefore, inquire about brahma (pure consciousness). Even in the West, the Greek philosopher Socrates stated, “Above all else know the self.” But since the time of Newton, the objective world became the focus of science to the exclusion of the conscious observer or scientist.

Now, in origin of life studies, observation reveals that life comes from life only. There is no evidence whatsoever to indicate that life is produced out of non-living matter. It was Louis Pasteur who disproved this theory of abiogenesis. From a purely empirical viewpoint, therefore, we have no justification for stating that life comes from inanimate matter. The evidence is that throughout the entire history of modern science such a production of life from matter has never been observed.

We know that life possesses qualities beyond the limits of our physical descriptions, in spite of all the claims of its origin from inanimate molecules. A fundamental quality of life is consciousness. To our knowledge, molecular evolutionists have never seriously tried to explain consciousness, because the symptoms of conscious awareness are simply beyond the realm of molecular description.

Here we encounter a strong drawback in the chemical model of life. Out of frustration, some people intentionally try to neglect this. For example, Niels Bohr remarked, “An analysis of the very concept of explanation would naturally begin and end with a renunciation as to explaining our own conscious activity.”

Bohr tried to explain everything by the quantum theory. However, since he felt that consciousness could not be explained by this theory, he had no choice but to “renounce” it. But consciousness exists nonetheless. As Wigner remarked, “Thought processes as well as consciousness are the primary concepts, our knowledge of the external world is the content of our consciousness, and this consciousness therefore cannot be denied.”

If we are to understand the mystery of consciousness, and the many other mysteries of life, it is clear that we cannot remain within the narrow confines of mechanical and molecular thinking. A broader perspective on reality is needed. Dr. Alexis Carrel, a French Nobel Laureate in medicine and physiology, expressed, “The second law of thermodynamics, the law of dissipation of free energy, indispensable at the molecular level, is useless at the psychological level, where the principles of least effort and of maximum pleasure are applied. The concepts of capillarity and of osmotic tension do not throw any light on problems pertaining to consciousness. It is nothing but word play to explain a psychological phenomenon in terms of cell physiology, or of quantum mechanics.”

We would therefore like to introduce an alternative view — the *Vedantic or Bhagavata Paradigm* — of the basic principles underlying nature. We have referred to these basic principles as the absolute truth, or the ultimate cause of all phenomena. Even though most scientific theories deal in practice only with relative descriptions of nature, the goal of science has always been to seek out the ultimate principles underlying reality. Yet, certain far-reaching assumptions about these principles have provided the foundation for all modern scientific research.

The dominant scientific view of the past two hundred years has been that these ultimate principles consist of a few basic natural laws which can be expressed by mathematical formulas. As this view appears to be far too restrictive to account for the phenomena of life, we propose an alternative view which may provide a framework

and an inspiration for further scientific research. This is essentially the view of the absolute truth as presented in the ancient Sanskrit text *Bhagavad-gita*. We would like to stress that this view is not being offered as a dogma or as a metaphysical explanatory device incapable of scientific test.

Although many of its features may appear difficult to verify empirically, others have very direct implications concerning what we may expect to observe. This view should serve as a stimulating challenge to the truly scientific spirit that wishes to go beyond the very restrictive framework imposed on our scientific understanding of nature for the past two hundred years.

In support of *Vedic View* of origin of life, Vedic literatures, directly indicate us that who create this universe, still we are trying to more experiments in different fields of science, only to prove that we, Human being are not wrong at all, we are more intelligent than the Supreme being who design us.

### 3.0 Renowned Thinkers Who Appreciated the Vedic View

Although early indologists, in their missionary zeal, widely vilified the *Vedas* as primitive mythology, many of the world's greatest thinkers admired the *Vedas* as great repositories of advanced knowledge and high thinking. Arthur Schopenhauer, the famed German philosopher and writer, wrote that: "I "...encounter [in the *Vedas*] deep, original, lofty thoughts... suffused with a high and holy seriousness."

The well known early American writer Ralph Waldo Emerson, read the *Vedas* daily. Emerson wrote: "I owed magnificent day to the *Bhagavat Gita*"

Henry David Thoreau said: "In the morning I bathe my intellect in the stupendous philosophy of the *Bhagavad Gita*... in comparison with which... our modern world and its literature seems puny and trivial."

So great were Emerson and Thoreau's appreciation of *Vedantic literatures* that they became known as the American transcendentalists. Their writings contain many thoughts from Vedic Philosophy.

Other famous personalities who spoke of the greatness of the *Vedas* were: Alfred North Whitehead (British mathematician, logician and philosopher), who stated that: "Vedanta is the most impressive metaphysics the human mind has conceived."

Julius Robert Oppenheimer, the principle developer of the atomic bomb, stated that "The *Vedas* are the greatest privilege of this century." During the explosion of the first atomic bomb, Oppenheimer quoted several *Bhagavad-gita* verses from the 11th chapter, such as: "Death I am, cause of destruction of the worlds..."

When Oppenheimer was asked if this is the first nuclear explosion, he significantly replied: "Yes, in modern times," implying that ancient nuclear explosions may have previously occurred.

Lin Yutang, Chinese scholar and author, wrote that: "India was China's teacher in trigonometry, quadratic equations, grammar, phonetics..." and so forth.

Francois Voltaire stated: "... everything has come down to us from the banks of the Ganges." From these statements we see that many renowned intellectuals believed that the *Vedas* provided the origin of scientific thought.

### 4.0 Conclusion

Scientifically, the Origin of matter as well as life is not known. There is no final theory of matter. Scientists-physicists and chemists- only try to understand the properties of different chemical components that make up the different lumps of matter and their physical and chemical properties. Biologist and biochemists, following the footsteps of physicists and chemists are also on the wrong path- because they borrow the concept that life is a product of chemical evolution. So in reality, they don't study life. Thus, they cannot go much further. Can the Big Bang theory explain the origin of matter and life? Material scientists take the shelter of the Big Bang theory, spiritual or theistic scientist take shelter of God.

Since life is a non-physical and non-chemical entity, any attempt to understand life in terms of chemistry and physics cannot go far. According to the teaching of Vedanta, matter and its particles-molecules, atoms, electrons, protons, quark and so on, are totally different from life particles, spiriton. Thus the Vedantic conclusion is that a DNA molecule is not life; a protein molecule is not life; and fundamental material particles are not life. Similarly, a combination of these molecules and particles will never lead to life.

Both life and matter operate according to the natural laws, or ultimate causative principles. However, certain laws are more specifically associated with life, and other are more specifically associated with matter. The simple push-pull laws of physics and chemistry undoubtedly have some bearing on the behavior of matter, especially in circumstances where life is not significantly involved (inanimate matter). However, these are best limiting cases of more general laws are involved with life.

The famous scientist Louis Pasteur remarked, "I have been looking for spontaneous generation for twenty years without discovering it. No I do not judge it impossible. But what allows you to make it the origin of life you place matter before life and you decide that matter has existed for all eternity. How do you know that the incessant progress of science will not compel scientist, to consider that life has existed during eternity, and not matter? You pass from matter to life because your intelligence of today cannot conceive things otherwise. How do you know that ten thousand years one will not consider it more likely that matter has emerged from life".

Science is nothing but the finding of unity, As soon as science would reach perfect unity, it would stop from further progress because it would reach the goal. Thus chemistry could not progress further when it would discover one element out of which all others could be made. Physics would stop when it would be able to fulfill its service in discovering one energy of which all the others are but manifestations. And the science of religion would become perfect when it would discover Him, who is the constant basis of an ever-changing world, one who is the only soul of which all souls are but delusive manifestations.

Science alone cannot solve the problems of the Modern age. We need additional guidelines for our actions, for the section of our research goals. These guidelines have to do with ethics, with philosophy, and with faith. We do not have to reinvent the ethics. Our ethical systems already have a many thousand years of old tradition. According to *Srimad Bhagavad-Gita (18.78)*, material success and spiritual enlightenment are complementary and mutually integrated.

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### Talk 3: Need to Critically Examine the Consequences of Scientific and Economic Development and Evolve Better Procedures to Understand the Reality

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**Keywords:** Science, Knowledge, General Systems Theory, Entropy, Order, Reductionism, Wholeness, Quantum Physics, Reality, Closed system, Open system