

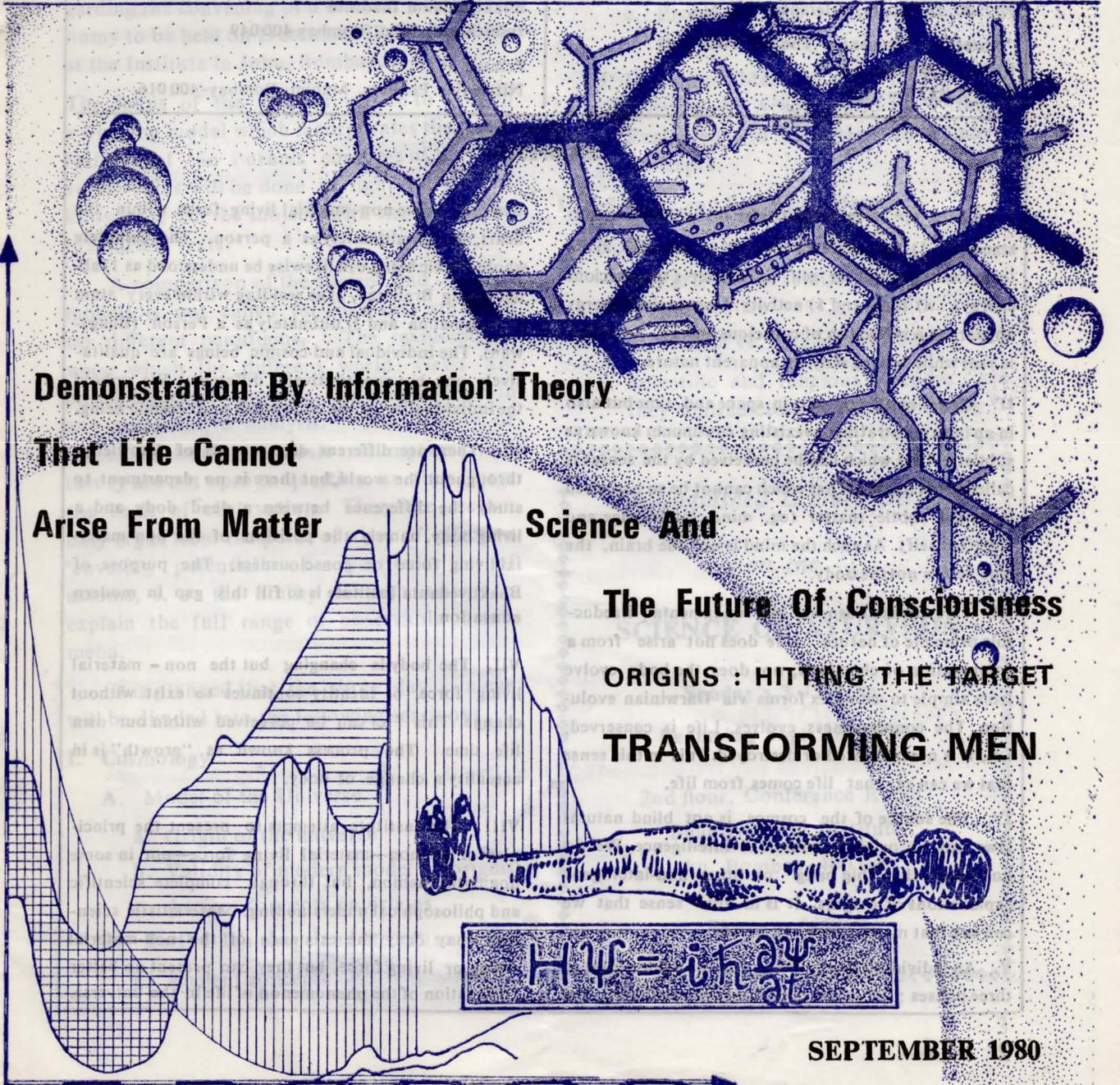
# BHAKTIVEDANTA INSTITUTE BULLETIN



Vol. 2

*Absolute is sentient thou hast proved, impersonal calamity thou hast removed.*

No. 9



**Demonstration By Information Theory**

**That Life Cannot**

**Arise From Matter**

**Science And**

**The Future Of Consciousness**

**ORIGINS : HITTING THE TARGET**

**TRANSFORMING MEN**

$$H\psi = i\hbar \frac{\partial \psi}{\partial t}$$

**SEPTEMBER 1980**

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## MANIFESTO

I. There are five basic truths for scientific understanding : 1) the original source of all energies, 2) life (conscious energy) or self, 3) matter (unconscious energy), 4) time and 5) activity. Unconscious energy appears as a reflection of conscious energy. As such it is real while having only an apparent nature.

II Matter exists not only in space and time but also in an interpenetrating, coexisting continuum known as subtlety. That which can be perceived by the senses is called gross matter. That which cannot be so perceived is called subtle matter (eg. mind, intelligence and apparent self). As such the mind is not the brain, the true self is not the body.

III. Life (consciousness) is a fundamental, irreducible principle of nature. Life does not arise from a combination of chemicals, nor does the body evolve from simple to complex forms via Darwinian evolution. The consciousness evolves. Life is conserved, i.e., it is never created or destroyed. It is in this sense that we can say that life comes from life.

IV. The source of the cosmos is not blind natural laws but an original, conscious intelligence. We do not accept the "big bang" or other non-intelligent explanations of origins. It is in this sense that we can say that matter comes from life.

V. An individual living being can be understood in three phases : 1) as the consciousness pervading the

body, 2) as the non-material living force within the heart, and 3) ultimately as a person. The complete whole cosmic being can likewise be understood as 1) all-pervading Brahman, 2) as residing within every atom as Paramatma and 3) ultimately as a Person (Bhagawan). The individual and cosmic beings are qualitatively one but quantitatively different. We uphold the individuality of the individual and cosmic being.

VI. There are different departments of knowledge throughout the world, but there is no department to study the difference between a dead body and a living body, namely the position of the non-material living force or consciousness. The purpose of Bhaktivedanta Institute is to fill this gap in modern education.

VII. The body is changing but the non-material living force, or identity continues to exist without change. This fact can be perceived within our own life time. The process known as "growth" is in actuality a change of body.

VIII. The Institute attempts to present the principles of the non-material living force—not in some dogmatic fashion, but through complete scientific and philosophical understanding. Materialistic scientists may deny the existence of the non-material entity or living force, but they can present no better explanation of the phenomenon of life in the universe.

**M**odern scientists take the view that only matter is real and that only sensory experience can give one any knowledge of reality. And so by taking matter as the only principle of reality they describe a living organism as simply a certain combination of material elements. Naturally the question arises, what is the origin of these combinations of material elements? The answer of modern science is given by the theory of evolution. The idea is that if you go back in time far enough you will find that matter was not in any particular state of organization at all. You'll find a cloud of gas in which atoms and molecules

are changes. For example, the famous French scientist, Pierre De Laplace, declared that all the phenomena of nature are simply the mathematical consequences of a small number of immutable laws. Laplace thought he knew what these laws were, but they have changed a great deal since his time. Still today scientists are also making the same declaration. Paul Dirac, Nobel prize winning physicist, declared that the underlying physical laws necessary for the mathematical theory of a large part of physics and the whole of chemistry are completely known. He was referring to the quantum mechanical

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## **Demonstration By Information Theory That Life Cannot Arise From Matter**

by R. L. Thompson, Ph.D.

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are merely whizzing about chaotically without any particular pattern or design. There are many different variants on this theme, but the basic idea is that as time passes, the interactions of atoms and molecules by themselves will produce everything that we see including living organisms and even ourselves.

There are essentially three factors which are involved in the process of evolution according to the view of modern science: molecular forces, chance and time, the active factor. Molecular forces actually correspond to the absolute or ultimate cause in the viewpoint of modern science.

This absolute itself is regarded as having no previous cause. This is what one could almost say, is a definition of what one means by the absolute cause. This absolute cause consists of certain laws of molecular action which are expressed mathematically.

Of course, as time passes in the development of science, the idea of what these laws

laws. According to him these differential equations account for all of chemistry. Any phenomenon which occurs within the range of temperatures and physical conditions necessary for chemical reactions are supposedly accounted for by these equations. The idea of the modern scientists is that the laws described mathematically by quantum mechanical equations are the ultimate cause and nothing lies beyond them.

It is also the view of science that life is simply a chemical phenomenon. Just to quote from James D. Watson, who is the famous Nobel prize winner involved in finding the structure of the DNA molecule,

*Complete certainty now exists among essentially all biochemists that the characteristics of living organisms will all be completely understood in terms of the coordinated interactions of large and small molecules.*

As this point of view essentially reduces reality to the particular laws governing matter, we should next say a little about what

matter is defined as. In modern science matter is reduced to energy and energy is reduced to a process. The process is believed to involve simple, insentient, unconscious entities which are interacting with one another in an essentially simple fashion. For example, in the Schrodinger equation one term describes electromagnetic radiation another describes kinetic energy or the energy of mass in motion, another describes the interaction between particles of matter and electromagnetic radiation, and the interaction of something called spin, etc. This is everything behind chemistry according to the modern scientists. So we want to examine the validity of this assertion in terms of what we observe of life.

### INFORMATION THEORY

We will approach this problem from the point of view of what is called information theory. Specifically, in modern mathematics there have been different ways of quantitatively measuring the amount of information, say in a book. You might say that a book contains information, and evidently different books contain different amounts of information. For example, a book which contained all zeros from beginning to end and nothing else would not have much information in it. On the other hand, a very intelligently written book might be said to contain a large amount of information, so we're going to be adopting one of those which was proposed by a mathematician named Kolmogoroff. He takes the information of a statement or a sequence of symbols as being the length of the shortest algorithm which will generate that sequence of symbols. This may be a bit technical, but the basic idea is that the shortest way that you can express a sequence of symbols will give us a measure of the amount of information in it.

We are going to take advantage of this concept to explore the question as to what the

absolute cause is and in particular, whether the quantum mechanical equations would be sufficient to account for life.

The first thing to do is to examine some of the phenomena of life and inanimate matter from this point of view. Just to illustrate the idea of a structure which does not have a high level of information consider two different crystals of carbon : graffite and diamond. These structures are made up of simple repeating units, six sided figures which repeat over and over again, all linked together. In very few words one can describe the basic hexagon and how to repeat them over and over again. So we can say that this structure has a low level of information. But we want to contrast this with the kind of structures we find in living organisms.

Cytochrome C is a particular molecule whose structure has been elucidated by various techniques. It is an enzyme apparently involved in respiration. But the main point about this structure is that in order to describe it, one would require a great amount of detail. One could not give a simple description in a couple of lines which could then be given to a third person, and from that simple description that third person could come up with this structure. So the point that we want to make intuitively, is that a structure such as this would have a large amount of information. Now this is one particular enzyme called a protein enzyme, which is found in living organisms. There are many of them. Enzymes, proteins, etc. are made up of amino acids. There are 20 amino acids. You can simply write down the amino acids in the cytochrome chain one after another. There are 246 of them. In these proteins the structure has to be very exact. If you change one or two amino acids to a different one, it will in all likelihood destroy the function of that enzyme, or it may even become a poisonous element. In the cells of living organisms, there are many thousands of enzymes of this kind, each having a very

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specific and complex structure. How could such structures arise, starting simply with a chaotic mixture of chemicals having no particular order?

### CHANCE

The next concept we have to deal with is chance. The idea is that molecular forces together with chance over a long time period cause various forms to come about. So let us calculate what chance by itself could do. If we pick a sequence as in chymotrypsinogen at random, what is the chance that you will get that particular sequence? We can calculate the chance that you'll come within 10 percent of that particular sequence, that is, a sequence in which 90 percent of your choices along the chain are correct. Allowing for ten percent error we get a figure of  $10^{167}$ . (As for the meaning of this number, you can calculate that if you made random trails of generating this structure, let us say in each little cubic angstrom unit box within the entire volume of the earth, and if you made the random trials once every billionth of a second, the length of time which would have to elapse before you could expect to find something within 10 percent of the structure comes out to  $10^{167}$  billion years.) These figures are actually a little bit ridiculous, it simply demonstrates that by chance alone you could never expect something like this to happen, according to the laws of probability. Now what would happen if we add molecular forces? If we have chance operating as well as these molecular forces, is it then possible for such molecules to form? This is where the concept of information is going to come in.

Let us consider how information can be distributed along a sequence of symbols. If we imagine a book, which is written out in one line, that line may go out for a couple of miles. One may think of the chromosome code of an organism in the same way, as on a

long line of symbols. There is a theorem which deals with how this information is distributed along that line of symbols. Basically, as you go along the line in one place you may have a lot of information and in other areas there won't be much information. The information going along the chain has to add up to the total information contained in the chain. The theorem states that in this distribution function one can write down a simple algorithm which generates the chain. In other words, if you are given the information at each point along the chain, then plugging it into this simple algorithm that algorithm will generate the chain step by step.

We can now illustrate an application of this theorem by applying it to the chain of the DNA code for a living organism, say a man. According to the central dogma of biology all the information in the human body has to be contained in the DNA chain. This means that if you go along the chain, you'll find the information needed to completely describe the structure of an eye, a brain, the muscle tissue, the kidneys, the liver, and so on, for all the different structures and organs of the body, all in complete detail right down to the last molecular arrangement. The consequence of this theorem is that if this total information content is a low figure (a very low number) then it follows that a very simple algorithm, which can be written in computer symbols, can generate all that information just by a simple calculation. It seems to be highly implausible, however, that a simple algorithm would have within it the power to generate all the information needed to give an exact description of eyes, optic nerves, retinas and so many innumerable features. Therefore we make the hypothesis that actually we must have very high information content. By doing some specific calculations one can come to an estimate that the information content must be at least as high as 100,000 (that is a very low estimate). From this point, one can draw some conclusions.

First of all, a simple process, that is a process governed by simple laws, cannot generate a structure with a large amount of information. In other words, information must be conserved.

### PRIMORDIAL CLOUD

Let us start out with a model of the earth a few billion years ago, approximately 4.5 billion years for the age of the earth. Assume you are starting with a chaotic cloud like the nebula that the solar system is supposed to have been formed from. This would be a cloud that would have no particular structure. According to the scientific model the cloud will condense and will form the sun, planets, oceans and continents. On the earth a primordial soup of chemicals will gradually accumulate and from these chemicals the original cells of life will organize themselves and these will subsequently evolve all the way up, step by step to human beings. This is the scientific model. To examine this model we can ask what is the probability of finding a particular complex structure in a system like this. The key point in this system is that it is governed by a very simple process. In other words, the laws governing change within this system are those given by Schrodinger's equation. They have a low information content, since we can completely write them down in a very short space. The probability of finding our structure evolving is  $L(P)$ , the complexity of the laws, minus  $L(x)$  which is the complexity of the structure. What this tells us is that if  $L(P)$ , the complexity of the laws, is smaller than the complexity of the structure then the probability of formation will be extremely small. In particular we choose some numerical estimates about 12,000 for the complexity of the laws, and for the complexity of the structure, about 100,000 for a low estimate, then we get a probability of evolution of something like  $64^{-90000}$ . This is the probability that structure could evolve within this system within lets say 4.5 billion years.

Originally we computed the probability of formation just by chance alone and found that such a thing could never happen. If we next allow simple laws to operate we still cannot find an appropriate probability of formation. Now intuitively there is an understanding behind this based on commonsense, namely that these simple laws contain only a limited amount of information. The difference in information has to be made up somewhere, and the only thing left over to make up that difference is chance. In other words, the difference between the information of the laws of nature and the information of the structure has to be made up by chance alone. But chance alone cannot hit on that information except with an exceedingly small probability. Let us take the example of writing a sentence by chance. Take a sentence of 50 letters. To write the first letter, you have one chance in 26, out of a 26 letter alphabet. And to write the second letter you have one chance in  $26^2$ . The third one is  $26^3$  and so on. To write a particular sequence of 50 letters is one chance in  $26^{50}$ . Likewise the information which is not there in the laws of the system can only be made up by chance. And this probability is practically zero. So this tells us something about absolute laws which must govern this system. We observe that the living organisms do exist. Yet in order for there to be any reasonable chance for their existence the laws themselves must contain an enormous amount of information. In other words, a simple process governed by Schrodinger's equation would not be adequate.

Another interesting implication of this theorem occurred to us after this was originally worked out. If you examine the mathematics lying behind this theorem, you can ask why it is that natural selection cannot generate a specific form. Analysis shows that there must be gaps between organisms. In other words it is not possible to have a continuum of forms from one organism such as an amoeba to a man, going by tiny steps, each

intermediate form being a perfectly good organism in and of itself. This analysis predicts that the different species involved must be separated by wide gaps in structure. It is interesting that many geologists are now granting that the fossil record shows this. Intermediate species which have always been required by the theory of evolution, are generally not found.

Now we would like to evaluate this theory and see what it implies about the nature of the absolute truth, or the ultimate cause of things. Figure A shows the sort of a diagram that represents what modern scientists have come up with. They say that the laws of nature are very simple, represented by the lower box. Vertical height represents information content. The higher boxes represent matter in different states of organization. The idea is that laws which are very simple will cause matter to become more and more highly organized with time. That is the theory of evolution. But we're ruling that out. Actually very simple laws can only cause transformations on the same level of simplicity. The vertical arrows here are missing. In other words simple laws cannot cause high levels of organization to come about. They can destroy organization that may happen to be created but they can't bring it about.

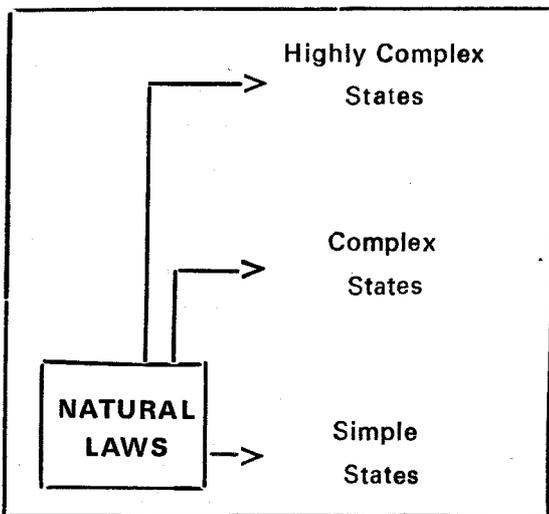


Figure A. Reductionistic Model

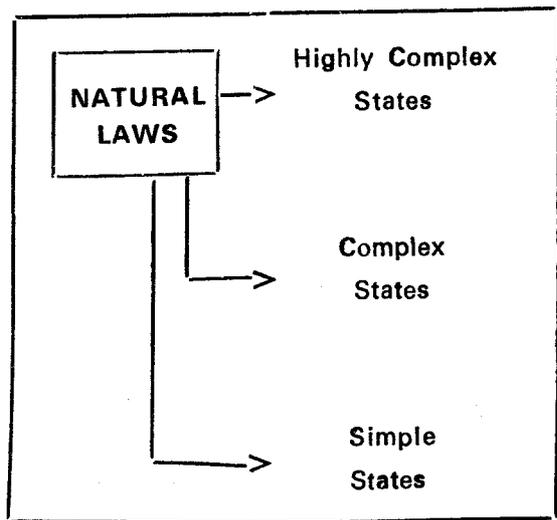


Figure B. Model With Higher Order Laws

So the next Figure B however, points out that if we no longer retain this picture of laws of nature, but have some natural laws that are themselves highly complex or that have a high level of information content, then such natural laws could organize matter to a comparable level of complexity, but they couldn't bring it any higher. The point is that the degree of organization produced cannot be any greater than the degree of information contained in the laws involved. The overriding idea behind modern science then, is that the ultimate cause must be something that can be described in terms of a system of mathematical laws. As long as you adhere to this concept, what you find from this analysis is that those laws must embody within their structure all of the information which is to be manifested in the final material structure. In other words, if there are human beings then those laws which cause matter to be organized into such forms must contain all of the information for a human being. In fact, all of the specific information for everything that we find in the universe must actually be built into the laws themselves.

So where does this leave us? Actually, this leaves us with a picture which at least, in the strictly mathematical sense, becomes very unsatisfying to the scientist. The tradi-

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tion in modern science is that nature is ruled by some unifying absolute cause, that there is some unity behind the workings of nature. In modern science the idea of that unity has been that the equations describing the absolute cause must be very simple. This was shown by Albert Einstein, for example, who noticed that in physics there are two fields—electromagnetic fields and gravitational fields. This bothered him because it indicated disunity. Gravitation didn't seem to have anything to do with electromagnetism, and vice versa. Because there was no unity, no basic pattern which would relate these two things, Einstein sought to find one equation which could describe both the gravitational fields and the electromagnetic fields all at once, so that they would both be different aspects of one original rule or cause. However, and this has been an overriding concept in modern science, if the mathematical laws behind nature have a very high level of information content, they cannot have any unity at all. The possibility of unity is gone simply because they must be very elaborate. And if you would relate them all to one simple equation that would contradict the fact that they have a high information content. Thus in order for there to be unity, one must transcend the modern conception of the absolute cause. The strict idea of mathematical laws is not sufficient to describe the absolute cause. In view of this we should consider that the absolute cause must contain within itself all of the information of the manifested world, in particular the instructions for all kinds of forms of living beings, including human culture, human personality, etc.

The conception of books like the *Bhagavad-gita* in which the absolute cause is described as a Supreme Person makes sense in this context. That one integrated conscious being can be the source of all the information and of all the manifestations in the universe is possible according to the arguments in this paper. □