evolutionist is not natural. An even grander design than evolution is evident. Animals were designed with the ability to avoid over-exploitation of their habitat without the need for disease, predation or starvation. Only recently is man learning to limit the harvest of renewable resources to assure the highest sustainable yields. Design in nature implies a Designer. "And God saw all that he had made and behold it was very good." (Genesis 1:31a).

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EDUCATIONAL COLUMN

TEACHING ABOUT ORIGIN QUESTIONS: ORIGIN OF LIFE ON EARTH

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Abstract

In the first article (CRSQ 21:115-19) in this four-part series the author stated the validity of two fundamentally contrasting viewpoints about origins; and in doing so, he provided objective, scientific data for (1) Total Creationism (based upon belief in Eternal, Personal Creator God who created all things), and (2) Total Evolutionism (based upon the belief that all things derived from some Eternal, Impersonal Matter-Energy condition,). By emphasizing limitations of proper, orderly scientific endeavor, he delineated that scientists deal with two kinds of inquiries: (a) inquiries to explain "present" natural phenomena (leading to the science of cosmology, for example), and (b) inquiries to explain unobservable origins of aspects of the "present" natural environment (leading to "Historical" Theories, such as cosmogonies). In a second article (CRSQ 21:189-94) he concentrated upon differences between the methods of cosmologists and cosmogonists, and presented itemization of circumstantial evidence for an Evolution Model and Creation Model about the origin of the universe. This article contains discussion of specific examples and illustrations of the above as applied to teaching about the origin of life on the earth.

Introduction

Science, as a proper and orderly profession, entails specifically the direct and/or indirect, *repeatable* observation(s) of *natural* objects and/or events that occur or exist in the physical environment.

Total Creationism (based upon belief in Eternal, Personal Creator God Who created all things), and Total Evolutionism (based upon the belief that all things derived from some Eternal, Impersonal Matter-Energy condition) involve unnatural objects and/or events (singularities). Thus these viewpoints cannot possibly be submitted to scientific study. Nevertheless, professionally qualified scientists of the majority do present objective, scientific facts in support of Total Evolutionism; and, also, professionally qualified scientists of the minority do present objective, scientific facts in support of Total Creationism, as listed in a previous article (CRSQ 21:115-19) in this series.

Whereas changing descriptions of the structure of the universe can be handled collectively under the term "cosmology," and ideas of scientists about the origination and generation of the universe can be subsumed under the term "cosmogony," there are at least two main ideas of scientists about the origin of life on the earth *in addition* to the majority position. Many, many modern biologists and biochemists accept the "conventional wisdom" about some sub-microscopic origin of life on the earth, but other scientists favor the idea that life came to earth from outer space; yet, a minority of scientists opt for the traditional, theistic view of origin of life on the earth (more on these latter concepts in other sections of this article).

Again, modern scientific endeavor is focused on the "present." Although developments regarding gene manipulations and synthesis and transfer of genes are "frontier" aspects of modern biology, nevertheless the ultimate origin of life on the earth is beyond application of scientific methodology. Biologists are not able to study scientifically the origin of life on the earth, as has been admitted by Bernal, Dixon, Mora, and other scientists. In short the principles of experimental science do not apply to discussions about the origin of life on the earth.

Modern Majority Position Evaluated

But what is the present position of the majority of biologists? According to their mechanistic, materialistic view of the universe, all reality came into existence through "evolution." Thus proponents of this view insist that life arose on the earth (or somewhere in the universe) from inanimate matter through chemical and physical processes still operating today. (A brief summary of this "chemical evolution"— sometimes called "molecular evolution"— is provided in Table I.) However, in order to protect the integrity of proper,

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Table I. Evolution Model for the Origin of Life on the Earth.

According to the evolution model, the story of life on the earth began some five billion years ago and gradually unfolded through a series of five stages:

Stage 1

Evolutionists have imagined that the atmosphere of the early earth was quite different from the present atmosphere. In contrast to the present *oxidizing* atmosphere, which contains 21% free oxygen (O_2), 78% nitrogen (N_2), and 1% of other gases, supposedly the early earth was surrounded by a *reducing* atmosphere made up mostly of methane (CH_4), ammonia (NH_3), hydrogen (H_2), and water vapor (H_2O).

Stage 2

Because of ultraviolet light, electric discharge, and high-energy particle bombardment of molecules in a reducing atmosphere, stage 2 came about with the formation of small organic molecules such as sugars, amino acids, and nucleotides.

Stage 3

Presuming all of this happened billions of years ago in a reducing atmosphere, then stage 3 is imagined during which combinations of various small stage 2 molecules resulted in formation of large polymers such as starches, proteins, and nucleic acids (DNA).

Stage 4

These large molecules supposedly joined together into gel-like globs called coacervates or microspheres. Possibly these coacervates attracted smaller molecules so that new structures, called proto-cells, might have formed.

Stage 5

Evolutionists believe that, finally at least one of these globs absorbed the right molecules so that complex molecules could be duplicated within new units called living cells. These first cells consumed molecules left over from earlier states, but eventually photosynthesis appeared in cells, in some way, and oxygen was released into the atmosphere. As the percentage of oxygen in the early atmosphere increased, most of the known forms of life on the earth today began to appear. Because of the presence of oxygen, these early life forms destroyed all the molecules from earlier stages, and no more chemical evolution was possible.

orderly scientific endeavor, modern science teachers should present students with candid evaluation of this mechanistic, materialistic view in the following manner.

For *Stage 1* biologists who speculate on the origin of life on the earth require a primitive earth model that includes tolerant conditions in which postulated chemical reactions leading to the origin of life could occur. Such "historical" theories are forced to postulate a primitive earth atmosphere very different from the present atmosphere, that is, an unnatural atmosphere.

Evolutionists are forced to imagine, *a priori,* that the primitive earth atmosphere contained no oxygen, that is, it was *not* an *oxidizing* atmosphere. Rather, most modern biologists insist that the primitive earth atmosphere was a *reducing* atmosphere. But such an atmosphere is an unnatural condition; and furthermore, Abelson and other scientists insist that no geochemical evidence can be found for a primitive methane-ammonia atmosphere. Noteworthy is the fact that the lowest sedimentary layers do not contain unusally large amounts of carbon or organic chemicals, as might be expected if some kind of reducing atmosphere of the earth ever existed.

Unnatural Conditions Required

Of course good circumstantial evidence exists for the formation of simple organic compounds in *Stage 2* as found in the outstanding work of Dr. Stanley Miller

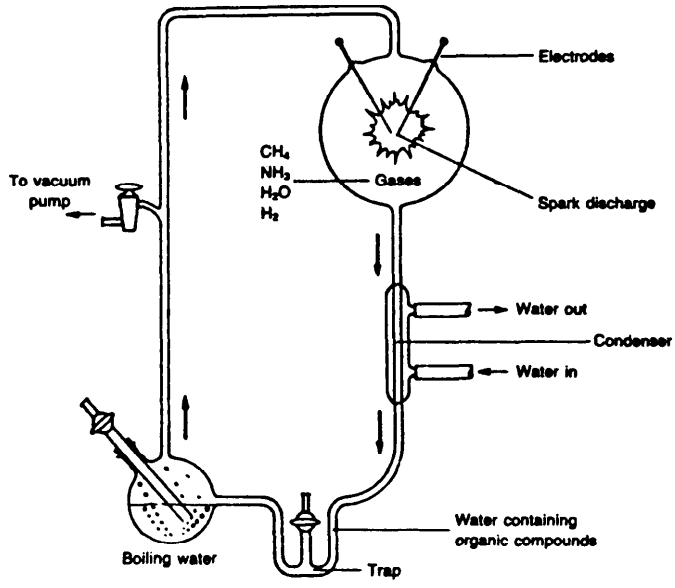


Figure 1. The Miller Apparatus.

and Dr. Sidney Fox. (See Figure 1.) However a vital part of these experiments on *synthesis* (not creation) of amino acids and a few other simple organic compounds under assumed primitive earth conditions was a cold trap (natural?) where synthesized products were collected. (More on the "cold trap" later.) Significant, also, is the natural tendency for biological molecules to go from the complex and well-ordered to the less complex and disordered state at temperatures at which life processes commonly occur. The success of all experimenters, then, is due to special conditions to minimize instability of organic compounds and maximize accumulation of quantities of simple organic compounds.

And most noteworthy is the fact that *both* "left-handed" and "right-handed" amino acids are formed in these experiments. However, *only "left-handed" forms of amino acids are found in living organisms.* This condition is a "mystery" for modern biologists, according to Dr. Francis Crick; and a "very puzzling fact," according to Dr. Linus Pauling.

Also very important is the fact that the simple molecules produced in the laboratory are *not living* substance. Synthesized organic compounds are not the same as the complex, large molecules of *Stage 3,* such as enzymes (which are chains of amino acids), so importantly characteristic of the *organization* and *coordination* that make living systems different from non-living matter. Enzymes are very special kinds of ordered proteins and so far modern biologists have only produced protein material more or less randomly. According to Dr. Fox, large and complex proteins formed on the earth in warm water ponds near the edge of volcanoes, but his scheme would require a unique series of events and unnatural conditions with questionable probability.

Evolutionary biologists believe that if large polymers, such as starch, proteins, and nucleic acids (DNA) could form on the primitive earth, then it would be possible (in *Stage 4)* for gel-like globs called coacer-

vates, or microspheres, to form. Oparin believes that coacervates might have been intermediate between loose molecules and stable living systems. However, it can be shown that necessary processes are not selective; and they are not stable, nor the basis of organization that would be duplicated.

Living Cells versus Coacervates

With regard to *Stage 5,* the significant differences between living cells and coacervates are organization and coordination that make living systems distinct from non-living matter. In all living systems the most fundamental example of coordination is the manner in which DNA codes for protein formation. DNA is the complex molecule of heredity, and proteins are the macromolecules of structure (organization) and function (coordination).

Most notable is the fact that many specific enzymes, which are proteins, are necessary for proper functioning of the DNA code during protein synthesis. Also, formation and selection of each amino acid in proteins depends upon several RNA molecules. In fact, the whole process of protein synthesis is a very complex system. (See Table II.)

According to the popular materialistic, mechanistic view of the origin of life, enzymes are special kinds of proteins that resulted from time, chance and unknown, supposed natural chemical processes. According to the accepted materialistic, mechanistic view of the origin of life, the complex relationship between DNA and proteins found in living cells also resulted from time, chance and unknown, supposed natural processes. Yet the dilemma of the appearance of the first cell according to this viewpoint has not been solved, and seems to be the final insurmountable barrier to the origin of life on the earth.

Table II. Weaknesses of Origin of Stable Metabolic Systems.

1. Vast quantities of macromolecules would have to be present in primeval seas at some saturation point where complex coacervates or protenoid microspheres would precipitate out of solution.
2. Such globular products are unstable and would easily disintegrate because there is not a natural tendency for more complex systems to form spontaneously from less complex systems.
3. Even if some catalytic ability did appear it would have been useless and plainly destructive.

Science Textbooks

This very brief critique of essential ideas of internationally famous biologists is given so that the science teacher might better evaluate some of the concepts involved. Thus the science teacher can be prepared to meet the tremendous promotion of the Thermal Model put forth by Fox, and the incredibly persuasive presentations of Oparin's ideas on the possible stages of formation of the first living cell on the earth.

Too often authors of high school and college science textbooks have accepted quite uncritically the ideas of evolutionary biologists. Textbook authors, of course, have been encouraged to write as they have because of the almost unilateral acceptance of the ideas of Fox and Oparin, and the lack of critical analysis of Miller's experiment, by leaders of scientific organizations and by editors of scientific journals and magazines.

Such wide acceptance of the mechanistic, materialistic viewpoint confirms the bias and really unscientific attitudes that dominate the educational and scientific establishments with regard to questions of origin of life on the earth. The science teacher should realize and be prepared to show students that not all written material that incorporates the evolutionary outlook is necessarily acceptable as scientific when gauged against criteria of proper, orderly scientific endeavor. (Also see Table III of special conditions required by complexity of life.)

Table III. Four Special Conditions Required by Complexity of Life.

The complexity of life requires at least four special conditions:

1. An open system of chemical change (which is characteristic of a green plant).
2. An adequate energy supply (which basically is the sun in this solar system).
3. An energy conversion system.
4. A control system for the whole complexity of the life processes (even in the single-celled life forms, which can never properly be called simple since all life forms are complex).

The fact that living organisms require *all four* of these conditions is quite a sufficient basis for students to realize that the passage of time alone could never result in the appearance of independent, stable, duplicating cells, as structural and functional units of the complexity of life.

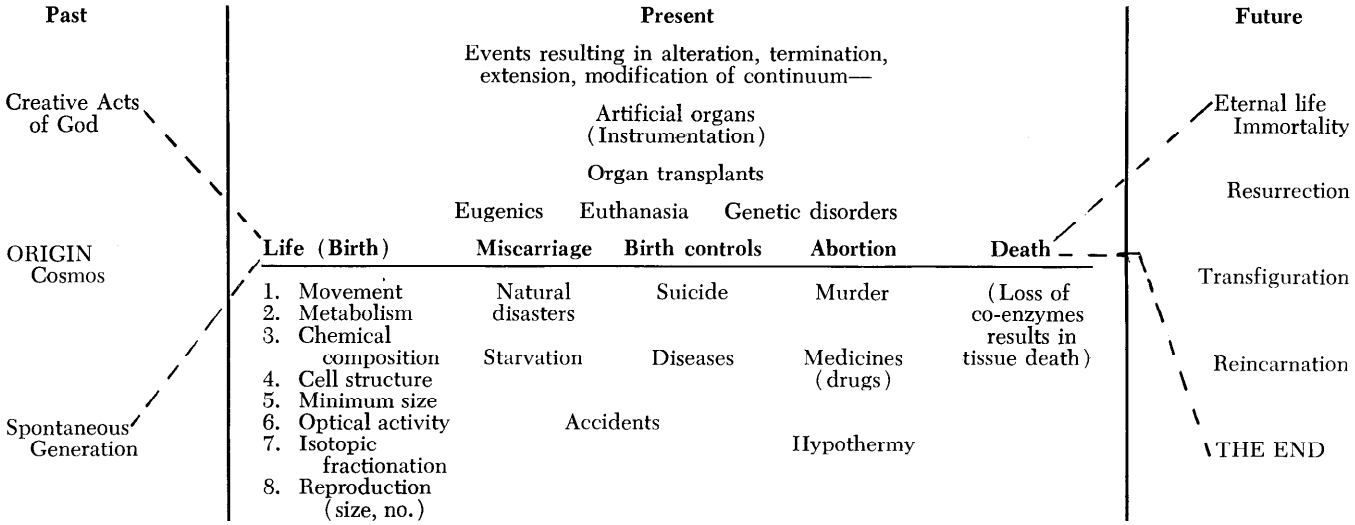
Life-Death Continuum

As an aid to teaching strategies that augment further objective, candid analysis of ideas involved in the majority position, the accompanying Life-Death Continuum can be very helpful as a frame of reference. (See Table IV.) This classroom-tested chart can be used effectively to focus attention upon the *synthesis* of amino acids versus the concept of original *Creation* of life.

In Creation/evolution discussions about the origin of life on the earth particular attention should be given to the entries shown as part of the "past" in the Life-Death Continuum. Over the centuries there have been repeated "outbursts" of debate about the origin of life on the earth. It is almost as if a debate question had been formulated in ancient times; and human beings had been taking "pro" and "con" positions on a question such as, "Resolved: Life on the earth came from some inorganic source." (See Table V of ideas on the origin of life.) Actually many scientists in the past, and modern proponents of sub-microscopic origin of life, have turned away from the century-old belief that the Creator God was the ultimate origin of life on the earth. In simplest terms the debate comes right down to the choice between some sub-microscopic combinations of sub-molecular units of matter as a result of time, chance and unknown, supposed natural chemical processes *versus* the origin of life on the earth from the Creator God, the First Cause of all things.

(The third position that life came to the earth from outer space involves the fallacy of "begging the question." No evidence of life, as biologists know it today, has been identified by way of any experiments in space. Even if some strong positive indications of life, or life supporting conditions, were found on Mars or another planet in the solar system, no answer would really have been gained regarding the basic question

Table IV. Life-Death Continuum



Vertical lines are "boundaries" which enclose essentially those concepts in the "present" that are amenable to scientific research. The events above the horizontal line might be discussed in science classes because of social significance; whereas those below the line might be mentioned only, since full attention in social studies, sociology, medicine, or related courses can be assumed. Scientists are generally agreed that they do not have any proper scientific means for studying the "future." It is important, then, for students to face the logical question: Can investigators scientifically study the "past"?

of the ultimate origin of life. The logical question would still be, what was the origin of life on Mars, or elsewhere?)

Now biology teachers should explain the move of many modern biologists away from belief in God as the ultimate origin of life on the earth, which belief was held by Pasteur and many other leading scientists who were founders of the biological sciences. Science teachers should make clear that the reason many biologists have turned away from the centuries-old belief in God as the ultimate origin of life on the earth is identified in their frame of mind of wanting to accept only a presumed naturalistic origin of life.

Critique of Naturalistic Ideas

Yet these scientists know of *no* naturalistic origin of the first life on the earth. When reductionist biochemists, like Oparin, Fox, and Ponnamperuma, imagine some five-stage origin of life as itemized already, they rely upon completely unnatural, that is, *supra* - natural ideas (those beyond the natural). That many modern scientists, who follow Oparin, Fox, and Ponnamperuma, do *not* stay within restrictions of their supposed naturalistic outlook or philosophy is manifest initially in their imagined belief that a *reducing* atmosphere once surrounded the early earth. A reducing atmosphere is *not* a naturally occurring phenomenon. *It is only imagined.*

Actually any belief in some spontaneous combinations of sub-molecular units of matter to form living substance is a direct contradiction of the Law of Biogenesis: Life comes from pre-existing life. Careful empirical findings have been basic to development of the Law of Biogenesis; and no evidence contrary to that law of nature (or natural law) has ever been identified from scientific study of objects and/or events in the natural environment, which is the "venue" of proper, orderly scientific endeavor.

The Cold Trap Problem

And there is a further unnatural aspect of the work of scientists who have expended a great deal of effort attempting to *simulate* early conditions of an imagined reducing atmosphere. Science teachers should make very explicit for students the unnatural conditions associated with the cold trap referred to already in Stage 2 of the imagined "chemical evolution" of life.

Several scientists have successfully synthesized amino acids and a few other simple organic compounds under assumed primitive earth conditions. But such experiments have involved use of a special trap to isolate the products gained from the interaction of the mixture in the apparatus and the energy source used for the synthesis. In other words students should understand clearly that successful production of amino acids in the laboratory was achieved as a consequence of very special conditions imposed by research scientists-conditions *not known* to have existed on the primitive earth.

The science teacher leading Creation/evolution discussions of the origin of life on the earth must be very persistent to point out that, as a result of the interaction of the gaseous mixture and the electric discharge in all supposed "origin of life" experiments, all derived amino acids and other products had to be *isolated* in a trap so that the products would not come into contact again with the source of energy. Since any source of energy is far more efficient in the destruction of the organic products involved than in their production, the necessary function of the trap was removal of the synthesized organic substances from the chemically active area of the apparatus. If the synthetically formed amino acids had not been removed by trapping they would have broken down because of their thermodynamically unstable nature.

Reductionist biochemists presumably are proponents of the philosophy of naturalism. As scientists

Table V. Ideas on the Origin of Life.
"Resolved: Life on the earth came from some inorganic source."

	PRO-Position	Con-Position
ABIOGENESIS	(No scientific theory or hypothesis is possible) 1. Macroscopic ideas: Ancient people believed in spontaneous generation of whole organisms, because they thought they saw mice come from mud and snakes from horses' hair, etc. (Aristotle, others) 2. Microscopic ideas: Next, people believed in spontaneous generation of microbes or bacteria because Pouchet (1860) and others thought they saw such occur in nutrient broths. 3. Sub-microscopic ideas: Today many scientists believe in spontaneous generation of subvital units of matter that formed into coacervates or proteinoids. (Darwin believed in one or many beginnings; Oparin believed in one combination of sub-vital units; Miller, Fox, Ponnamperuma have used controlled experimentation to synthesize amino acids, which are not living.) 4. Cosmic ideas: Over the decades and still today some scientists *believe* that life came to the earth from other planets or other parts of the universe by way of spores or meteorites. 5. Theistic ideas: Over the centuries some scientists *believe* life is result of supernatural creative acts of Creator God; life that has always been complex. (Note: Beliefs in #l thru #4 all entail unnatural events.)	BIOGENESIS Conclusive controlled experimentation of Francisco Redi (1650) with covered and uncovered meat *established* that life came from life, at least flies from maggots which came from eggs laid by flies. Conclusive work by Appert and controlled experimentation by Louis Pasteur (1864) with swannecked flasks *established* that bacteria may be dust-laden and a source of bacterial life from life. Instantaneous synthesis of amino acids requires human intervention, hence no man can study spontaneous generation, which by definition entails *no external* intervention. (Blum and Cook point out chance of life coming from no life; Coppedge indicates high improbability of *only left-handed* protein substances in living organisms.) These ideas "beg the question," side step problem of origin of life; no other planets known from space probes (Mercury, Venus, Mars, Jupiter, or Saturn) seem to have life as we know it. Heat of meteorites, x-rays, ultra-violet light would have real deleterious effects on life. No scientific study possible, but a Creator of life would not be in contradiction to concepts of cause and effect, or degradation or degeneration from complex organizational order.

they are supposedly devoted to studying naturally occurring objects and / or events. But the cold trap has *no natural* analogue. There is no such chamber known in the present natural environment; and no such chamber is known of any presumed primitive environment, which could function as a "trap."

In sum, then, specific unnatural features are involved in the laboratory experiments by which scientists purport to represent or simulate some imagined primitive atmosphere. An oxygen-free atmosphere is unknown (and specific geologic evidence can be used to deny that there ever was an oxygen-free atmosphere on this earth). Also, no natural chamber is known that could "trap" organic substances supposedly formed after lightning discharges or ultraviolet radiation. In order to protect the integrity of proper, orderly scientific endeavor these aspects of the "establishment" materialistic, mechanistic ideas about the origin of life on the earth should be made fully evident.

What If Life Is Synthesized?

Now students might ask the science teacher, what if scientists do synthesize living substance? Of course, if scientists are successful some day in synthesizing living substance, their work will be the result of careful planning and controlled execution — so that the whole process can be repeated. All careful, proper scientific work must be repeatable.

Since living substance is complex, if scientists do successfully synthesize living substance (no scientist creates matter), they will do so because of a planned "recipe," a proper complex mixture of elements (of unknown origin which they have not produced). Thus biology teachers should make explicitly clear that synthesis of living substance, if it ever occurs, will be a forthright attestation of the human intellect involved. Human intelligence will have been involved since scientists selected the "ingredients.' Human intelligence will have been involved since the process will not have been an accident, and will necessarily be repeatable according to a definite formula.

And so, by analogical reasoning, if human intelligence of necessity will be involved in any successful *synthesis* of living substance, then it follows logically that an Intelligent Creator was involved in the *ultimate* origin of life on the earth. Even the most elementary student really has no difficulty in noting pattern and order— hence has an appreciation of design. All school buildings, all machines, all play equipment are carefully assembled according to some plan— as is easily appreciated by students of all ages. They *know* there was some blueprint for all of mans inventions. So they can understand that God was the Designer of all original life on the earth. (See circumstantial evidence in Table VI.)

Table VI. Two Sets of Evidence.

Circumstantial Evidence for Spontaneous Origin of Life on the Earth	Circumstantial Evidence for Creator Origin of Life on the Earth
1. Synthesis of coacervates and cell-like globules	1. Chemical tendency away from life, tendency toward breakdown
2. Synthesis of amino acids (non-living "building blocks" of living substance)	2. Complex pattern (design) of DNA code, molecular interdependency, cell organelle and organ interactions
3. Production of synthetic "equivalents" of urea, rubber, cloth fibers	3. Definite pattern (design) of exclusively "left-handed" amino acid structure
	4. Law of Biogenesis: Life comes from existing life.

Theistic Alternative

The belief that God created life is very ancient and is traceable to the Hebrew traditions regarding first origins. In fact the position that God created life on earth was long held by scientists through the centuries until popularization of the philosophy of naturalism. Essentially, the belief in some sub-microscopic coming together of sub-molecular units of matter, or the belief that life came to the earth from space, are *substitute* concepts to the long held belief that God created all life— the idea of the theistic origin of life on the earth.

Actually the theistic concept of the ultimate origin of life, in twentieth century science, is a viable and fully rational belief. How rational is the belief that presently known complex cellular life came into existence, once upon a time, after some chance combination of sub-molecular units of matter as a result of supposed, unknown natural processes?

Thus, science teachers, who are responsibly concerned about the integrity of science teaching, can explain to students that a belief in the Eternal Creator as the source of plant and animal life, including human beings, on the earth is wholly logical, rational and in keeping, in turn, with the cause and effect assumption so fundamental to careful, proper scientific thinking. Many scientists, today, accept that the Creator God was the First Cause. Thus theistic beliefs about the ultimate origin of life on the earth are not in any way anti-scientific.

Students should recognize that modern scientists utilize elemental materials at their disposal to prepare a certain mixture in their experimental equipment. *But whence cometh the elemental materials?* Do reductionist biochemists create elemental matter? No! Do reductionist biochemists create life? No! Pasteur and many leading biologists who founded the biological sciences believed that the Creator God created matter. For them, the Creator God was the First Cause of life on the earth; and this is true, once again, of a minority of theistic biologists.

The Theistic Framework

Furthermore, the instantaneous chemical reactions in the biologists' experimental apparatus (which are *not spontaneous* chemical reactions, since scientists intervene externally to select "ingredients") may properly be associated with the sustaining acts of God, the Almighty. Hence the theistically oriented biologist may most rationally maintain, in candid responsible manner, that the instantaneous chemical reactions detectable in scientific experiments regarding the *synthesis* of amino acids are associated conceivably with on-going, sustaining actions of the Providential God in whom he or she believes. Again, in maintaining the integrity of proper academic freedom of *all* students and *all* teachers, these aspects of creation/evolution discussions should be made evident.

In short, the evidence for God— the Sustainer— is verily all around the theistic biologist. Truly, he or she is without excuse in pointing to possible evidences of the Creator's activity in the chemical reactions that are *not seen* involving the ingredients that are *seen.* Therefore, the scientist who describes regularities of naturally occurring objects and/or events in expressions of various scientific laws, natural laws (or laws of nature), may very well be describing the way God acts as He sustains and maintains His creation.

EXTRAPOLATIONS IMPLICATIONS

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Abstract

Scientific and engineering data are taken within the constraints of physical, biological and chemical systems. The validity of the data is further limited to the adequacy of the sampling regime, and both repeatability and accuracy of the measurement process. Models built from such data ought to be bounded by these conditions and extrapolation from the models should show healthy scientific restraint and reasonable justification. Those which do not, often lead to incorrect decision-making and mislead others either intentionally by disregarding boundary conditions or facts, or unintentionally by carelessness. Evolutionary theorists are guilty on both counts and creationists should learn from this and be critical of their own data extrapolations.

Introduction

Whenever an investigation of a system is undertaken and a researcher begins to select samples for test and data collection, there are several questions that first must be asked. What is the purpose of the experiment? Should I take a stratified sample or a random sample? How much uncertainty can I afford? (That is: how much risk am I willing to take?) Questions like these can lead to a specially planned experimental design rather than haphazard trials which are costly in terms of time, materials, and funding and which may be totally insensitive to critical interactions between factors of interest.[1] Usually, some kind of random sampling and order of testing is set up to ensure that: a) the sample is representative of the population from which it was taken, and b) unforeseen bias such as equipment drift or environmental changes do not unduly affect any one segment of the experiment. A simple example of a nonrepresentative sample would be if a new drug were injected into a group of male pre-medical students to assay its effects on human physiology. Here no account is taken of the restricted age, sex, race, geographic location, or current state of health and therefore any results would hold only for male pre-medical students in the age, health, and geographic range included in the experiment. Another important element is the size of the sample, for this determines the sensitivity of statistical comparisons and the confidence which may be assigned to experimental results.

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