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Fifty Years of Chemical and Biochemical Examination of Evolutionary Theory in the *Creation Research Society Quarterly*

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Introduction

The subject matter in this review focuses on the application of chemistry and biochemistry to the presumptions, speculations, and theories of chemical evolution. This review, covering articles published from 1964 to the present, is not presented chronologically. Rather, the order of presentation here follows the alleged route of "chemical evolution," or abiogenesis, which occurred in an assumed primitive, reducing (no oxygen) atmosphere by purely natural processes without divine guidance or direction.

Formation of Amino Acids in the "Primitive Atmosphere"

An Israeli scientist, M. Trop (1979), presented substantial, if not fatal, problems in the chemical evolution of amino acids, pointing out not only the chirality issue but also the many competing reactions that would occur from any realistic consideration of chemicals present in the primitive atmosphere. There is no empirical evidence for an oxygen-free atmosphere in the history of the earth.

The famous Miller experiment was closely examined by DeMassa and Boudreaux (2013). They noted that the organic substance present in the highest yield (3 X more than the highest yield amino acid) was formic acid. Formic acid would act to terminate peptide formation beyond a few amino acids, stopping chemical evolution at the onset.

First and Second Law (Entropy) Considerations

In 1966 Emmett Williams began his argument that the first and second laws of thermodynamics are incompatible with biological development and provided articles in *CRSQ* over three decades. His 1971 *CRSQ* article considers entropy flux as heat flow, steady states of living organisms, and entropy. Williams (1967, 1969, 1973, 1979, 1992) addressed the "entropy excuses" of materialist scientists such as Prigogine. Penny (1972) considered the distinction between the first and second laws, useful energy becoming unavailable, dispersed heat, the role of our sun, and life's destiny assuming universal evolution. An improbability of forming one 300-amino-acid peptide (protein) by random chance is given as $1/10^{515}$—an impossibility.

D. Russell Humphreys (1978) presented a brief but important consideration of whether the earth's sun and source of enormous energy could provide the entropy uptake for the entropy loss during evolutionary gain in complexity. The answer to the sun as entropy gain during entropy loss as life emerged and evolved is presented in this short article. The sun provides 140×10^{12} cal/deg/sec (entropy flux unit), and this heat energy influx necessarily increases entropy on the earth. The sun is acting on the earth to provide energy for food production, and food in turn will keep the entropy in living things in check. The total entropy of the earth and sun, however, will continue to increase (also discussed below).

Creager (2012) applied second law considerations to the origin of life, information theory, DNA matters, and whole living systems. Whether or not entropy increases or decreases depends on (1) what form of energy or information is provided, and (2) whether a designed system to receive the energy is present

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in life, such as chloroplasts in plants or metabolic systems in animal life.

Secular scientists fully admit that the chemistry of life depends on "non-equilibrium but steady state" biochemistry. Nobel Prize winner E. Schroedinger stated that the defining property of living systems is the ability to reverse entropy and keep it in check throughout life (Ricardo and Szostak, 2009). Biochemical processes move to equilibrium and maximum entropy at the time of death. Exact quantitative measurements of entropy during life are far too complex to measure; biochemical steady states may be considered metastable equilibria removed from true equilibrium or maximum entropy.

The Chirality Problem and Synthetic Problems

Coppedge (1971) wrote concerning the probability of purely L-amino acids being formed by natural processes and provided a number of probability calculations supporting his thesis that that such stereo-specificity is flat-out impossible.

Helmick (1976) noted that L-amino acids racemize (convert from L to the D form) with time by acid or base catalysis, and this rate provides a molecular clock if properly used. Racemization of chiral amino acids and peptides would prevent chemical evolution.

Murphy (2013) critiqued the attempts by investigators to overcome the chirality issues and the immense difficulties in forming peptides from amino acids by a fortuitous, purely naturalistic process, one unassisted or caused by God.

Formation of Proteins, Carbohydrates, and Nucleotides including ATP by Evolution

Trop and Shaki (1974) found the naturalistic evolution of proteins to be a mathematical impossibility, even with absurd rates of protein formation (10^{13}/sec.) over all of evolutionary time. Baurer (1971) considered how life, being carbon-based, is designed for great versatility in the kinds of molecules available, including alkanes, alkenes, alcohols, aldehydes, acids, amines, ketones, ethers, esters, and a vast variety of carbohydrates. Boudreaux (1997) reported on the thermodynamic possibility of silicon and not carbon as foundational atom for life. Silicon was proposed as a possibility, reasoning that since life is an accident, life based on silicon's four bonds, instead of carbon (four bonds), may be expected in other inhabitable planets or could have been the evolutionary outcome on earth if there had been a different chemical evolution history.

Bergman (1999), a prolific contributor to creationist science, noted the design aspects of ATP, the perfect energy currency for living cells. He examined the endosymbiosis theory of mitochondria (with ATP) being initially a primitive stand-alone life-form. Design in lipid molecules was presented by Heyes (1986). Smith and Brown (1985) reviewed the conjecture that mitochondria existed independently and then fused with prokaryotes to form eukaryotes. Anderson (1989) noted that even given the production of necessary biochemicals through chemical evolution, the formation of an initial living cell capable of reproduction is still far too complex to have occurred by natural means.

From Prebiotic Chemistry to "Protocells" and on to LUCA, to Bacteria, and Up

Boylan (1978) reviewed the entire speculated sequence from the primitive atmosphere to the multiplication of species. He noted the thermodynamic and probability barriers to common descent (universal evolution). He noted that the number of possible arrangements for a small protein formed with the 20 standard amino acids of 100 in length is 10^{130}. In addition, the probability of the chance occurrence of life on earth, even with repeated trials of a billion/second for all of supposed evolutionary time, spirals to 1 in 10^{103}, which makes it beyond any reasonable definition of possible.

Biochemist Duane Gish, a noted creationist, presented a thorough discussion (1979) covering all the origin-of-life proposals up to that time and detailing the experimental failures. All steps from nonlife to life proposed by evolutionists were discussed by Gish. John Moore (1985) also reviewed origin-of-life proposals.

Extraterrestrial Origin-of-Life-on-Earth Theories

Intractable barriers to the evolution of life on earth have led to the desperation of proposing that life exists on other planets and this life was transported to earth in the distant past. This "exobiology" became widely popular in the 1960s and 1970s through the topic of unidentified flying objects (UFO's). Bergman (1995) reviewed the ideas surrounding life from outer space promoted by notables such as Carl Sagan, Orson Wells, and H. G. Wells.

Nobel Prize winner Francis Crick once proposed life from outer space to overcome the incredible improbability of life appearing on earth. Many astronomers today are searching for signs of life on other planets, some thinking that finding extraterrestrial water is evidence for life beyond earth. Some theologians have argued that because God created life on earth, He could have done so elsewhere in the universe (the Bible does not specifically preclude this). Countering the extraterrestrial speculations are those showing the unique location (distance from the sun), physical constants, temperature, rotation time, and atmosphere that are just right for life to exist on the

earth and only on this earth. Clearly, there is not a hint in the Bible of sentient life beyond earth.

Life in the Test Tube Studies

Biologists generally agree that the essential characteristics of life are (1) complex organization, (2) metabolic energy transformation, (3) growth, (4) reproduction, (5) irritability, and (6) adaptation within limits. Creationists and some evolutionary biologists have pointed out another mandatory characteristic, (7) information to direct and control life processes. Creationists rightly insist that Information can arise only by the design of superior, transcendent intelligence—God. Materialists have falsely assumed that information can arise in the genome (DNA) by accumulated random additions to the genome—a theory that is becoming more and more difficult to defend.

Frair (1968) examined the speculations of evolutionary biologists in progressing from virus to protocells. A particular *in vitro* experiment cited showed that DNA polymerase did not produce "test tube" DNA if nuclease were present, as it is in every cell. In living cells, the polymerase and nuclease activities are prevented from countering each other at the same time. Because viruses lack many of the classic characteristics of living systems (e.g., metabolic transformation of energy) and can reproduce only in a host cell, they are not considered living organisms and are considered just replicative entities.

McDowell (1971) connected information to entropy by pointing out how the statistical form of the second law of thermodynamics resembled the relationship of information content and probability. Anderson (1989) critiqued the alleged primitive predicament, particularly the supplying of energy to protocells existing before LUCA (last universal common ancestor) and prokaryotes. Moore (1985) commented on what would be the creationist response if life were synthesized in the test tube.

When insulin was first synthesized, some claimed this was the creation of life in the test tube. This claim is no longer made since biochemists have become more skilled in taking components from cells and inserting them into other cells and producing a metabolic step or reaction. Evolutionists will always utilize biochemical components produced and taken from living cells in their "life-in-the-test-tube" experiments.

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