

SPONTANEOUS LIFE... DEAD IN THE WATER!



“The origin of life appears almost a miracle, so many are the conditions which would have had to be satisfied to get it going.”

–Francis Crick, co-discoverer of the DNA double helix structure¹

Introduction

According to evolutionary theory, all life – bacteria, plants, and people – evolved from a hypothetical first cell, which allegedly arose spontaneously from chemical substrates. This is said to have happened over 3 billion years ago. That hypothetical first cell has been called LUCA (last universal common ancestor). This first cell is assumed to be at the very base of Darwin’s hypothetical “tree of life”. It is almost universally claimed that life came from non-life (abiogenesis). Is this good science? It is almost universally claimed that spontaneous generation of life is the inevitable outcome of time, chance, and the right chemical conditions. Is this claim even remotely credible?

School curricula, textbooks, educational science programs, and countless museums consistently insist there is a strong scientific case for the spontaneous origin of life. From a naturalistic evolutionary perspective, it should not be surprising that spontaneous generation is assumed to be feasible, as it is essential to the evolutionary story. We can’t have Darwin’s “tree of life” without the trunk, which emerged from the primordial seed of that first cell. We are continuously told stories that sound like plausible scenarios for how simple inorganic molecules might have come together to give rise to the first living cell. However, upon careful examination, we find that the stories being told are not only extremely speculative – they are rationally indefensible. In the zeal to market various origin-of-life theories, countless insurmountable problems are conveniently swept under the rug. When it comes to the origin of life, real science has been replaced by just-so stories, wishful thinking, and hype.

It is a simple, irrefutable fact that spontaneous generation of life has never ever been observed. This is true even though this world is filled with biochemical substrates of all sorts, and environmental conditions of every kind. This remains true, even though countless teams of scientists have done everything in their power to try and force the “spontaneous” generation of life. No scientist has been able to demonstrate (or contrive) any type of spontaneous origin of life – even though such a discovery

1. Francis Crick, quoted by John Horgan, “In the Beginning,” *Scientific American*, pp. 116-125, February 1991.

would mean instant fame and fortune. In reality, there is absolutely no evidence of abiogenesis. To date, all experiments have helped confirm the opposite – life only comes from life – without exception. As biologist Dr. Rob Carter aptly puts it, *“Random chemical reactions can only produce random chemicals – not life”*.

In this article we will be addressing a number of the origin-of-life theories that have been proposed by evolutionists, starting with Darwin himself. Interestingly, these proposed theories have consistently been formulated in response to the failure of the previous attempt to observe spontaneous generation. Today, the latest theories, including the “RNA World” hypothesis and the claims of “self-replicating” RNA enzymes, fail to bring us any closer to a credible mechanism for the spontaneous generation of life.

Louis Pasteur and the Law of Biogenesis

The belief that life can spontaneously arise from lifeless, inorganic matter has been common since the time of Aristotle in the 4th century BC. For instance, in the 1600’s a Dutch physician and chemist, Dr. Jan Baptista von Helmont, believed that he had proven that adult mice could spontaneously generate from dirty underwear mixed with wheat in a fermenting jar.² Obviously this is laughable to us today. In the 19th century the myth of spontaneous generation of life was demonstrated to be scientifically untenable. This paradigm shift is largely credited to Louis Pasteur, a French chemist who experimentally refuted the theory of spontaneous generation.³ In 1864, Pasteur firmly established the Law of Biogenesis that dictates all life always comes from pre-existing life. After obtaining the results from his experiment, Pasteur declared, *“Spontaneous generation is a dream.”*⁴ His findings were summarized by the phrase *Omnis cellula e cellula* which translates, “all cells are from cells” – a principle that is foundational to modern cell theory and modern medicine. It is now universally observed that *life comes from life*.

The Law of Biogenesis is considered a *law of nature* – meaning it is consistently upheld and is always shown to be true without any exceptions. There are very few natural laws, and such laws carry the highest degree of certainty (i.e., Newton’s Law of Gravity). Pasteur gave us this law, and he is arguably the greatest biologist who ever lived. He is renowned for discovering the fundamental principles of vaccination (he developed the first anthrax and rabies vaccines), microbial fermentation, pasteurization, and the germ theory of disease. The germ theory of disease became the cornerstone of modern medicine. For these reasons Pasteur is regarded as the “Father of Microbiology.” Until somebody can directly observe the spontaneous generation of life, the Law of Biogenesis will continue to stand firm as a natural law. To challenge the Law of Biogenesis without overwhelming experimental evidence that demonstrates spontaneous generation is neither rational nor scientific. This is why it is common to find so many quotes from leading origin of life researchers (most of whom are committed evolutionists) who openly acknowledge that abiogenesis is not even remotely possible (see Appendix 1).

Darwin’s “Warm Little Pond” – Is Life Simple?

The vague notion of spontaneous generation was discredited when the Law of Biogenesis was firmly established by Pasteur and others in the 1800’s. Yet evolutionists have stubbornly remained committed to the concept of spontaneous generation – most notably Charles Darwin himself. Darwin was strongly motivated by his desire to explain natural history (including the origin of life) through purely natural processes. His belief in abiogenesis was not based on any scientific evidence, but was actually *contrary*

2. <http://evolutionwiki.org/wiki/Abiogenesis>

3. https://en.wikipedia.org/wiki/Louis_Pasteur

4. <https://en.wikipedia.org/wiki/Biogenesis>

to all the scientific evidence of his day (i.e., Pasteur's S-shaped flask experiment and others). As Hubert Yockey, physicist and information theorist writes in the *Journal of Theoretical Biology*,

*"The 'warm little pond' scenario [the origin of life theory speculated by Darwin] was invented ad hoc to serve as a materialistic reductionist explanation of the origin of life. It is unsupported by any other evidence and it will remain ad hoc until such evidence is found..."*⁵

In a letter to his friend Joseph Hooker in 1871, Darwin speculated about the possibility of a rudimentary microbial life form emerging from what he called a "warm little pond" on the primitive earth. He wrote,

"It is often said that all the conditions for the first production of a living organism are now present, which could ever have been present. But if (& oh what a big if) we could conceive in some warm little pond with all sorts of ammonia & phosphoric salts, light, heat, electricity etc. present, that a proteine (sic) compound was chemically formed, ready to undergo still more complex changes..."

Darwin imagined spontaneous life arising from ammonia, phosphoric salts, and energy – due to his mistaken perception life was very simple. In Darwin's day, a single cell appeared under a microscope to be no more sophisticated than a simple jelly-like blob. Darwin's naivety is not surprising since he lived well before the biological revolution. It was with this naive understanding of living systems that Darwin dared to write in his famous work, *On the Origin of the Species* (1859),

"If it could be demonstrated that any complex organ existed, which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down. But I can find out no such case."

Notice that he states, *"But I can find no such case"*. But now, in the 21st century, science is revealing a universe of biological complexity that Darwin could have never imagined. Inside just one cell is a vast microscopic world, the marvelous complexity of which is comparable to that of New York City (not an exaggeration). Scientists now know that a single cell consists of millions of molecular "nanomachines" (literally) and a labyrinth of information networks greatly surpassing the best human information technologies. In many ways these information networks are comparable to the Internet. By comparison to what we know today, Darwin knew next to nothing. He could have never guessed that a single human cell contains 6 billion genetic letters encoding a symbolically represented language system that is very much like human written information, but far more complex.⁶

The Miller-Urey Experiment

In 1953 two chemists from the University of Chicago, Harold C. Urey and graduate student Stanley L. Miller, conducted the now famous "Miller-Urey experiment". The goal of the experiment was to demonstrate the feasibility of the spontaneous origin of life by forming one of the basic building blocks of life (amino acids) in a test-tube environment. This experiment has been used in textbooks for decades; supposedly supporting the idea that spontaneous generation of life might be feasible. Ironically, this experiment only showed that two chemists were able to artificially synthesize a few simple chemicals (amino acids, which are the building blocks of proteins). Producing a few biochemicals

5. Yockey HP, A calculation of the probability of spontaneous biogenesis by information theory, *J. Theor. Biol.* 67:377-398, 1977.

6. Sanford J. 2013. Section Two – Biological Information and Genetic Theory: Introductory Comments, In: Marks II RJ et al., (eds) *Biological Information – New Perspectives*, 2013, pp. 203-209.
http://www.worldscientific.com/doi/pdf/10.1142/9789814508728_others02

does not explain the origin of the cell for the same reason the production of some bolts and nuts cannot explain the origin of New York City. No actual proteins were formed, no biological information was created, and life certainly did not arise. Why has this silly, little experiment been used for so long as evidence for spontaneous generation of life? It was (and still is), used in textbooks for lack of more credible evidence. In the absence of real evidence – this experiment was used as a temporary *filler*, and so for decades naïve biology students have been misled.

The experiment used the gases hydrogen (H_2), methane (CH_4), and ammonia (NH_3), which were sealed in a glass flask half-filled with water. Since the gases normally do not react with one another in natural conditions, electric sparks were fired between two electrodes to drive the chemical reactions (supposedly simulating lightning acting on the early earth atmosphere). Any molecules that formed were dissolved into a condenser and preserved in a separation chamber (supposedly simulating an “ocean”). Within a week the experiment yielded a toxic mixture of tar and resin that would be detrimental to life, with only trace amounts of amino acids – 1.05% glycine and 0.75% alanine. These two amino acids are two of the 20 amino acids required for life, but they are not themselves life. In the same way, if you could make two English letters (say z and c), this is not the same as a book with useful information. Amino acids are like letters – they have no biological significance individually. Even if they had synthesized all 20 types of amino acids they would have been no closer to having a living cell – they would just have alphabet soup. If they had caused all the oceans to be filled with unlimited amounts of amino acids – they would have been no closer to having life arise spontaneously. Indeed, they would have been no closer to getting a single functional protein. In fact, the Miller-Urey experiment has zero relevance to the origin-of-life question, because no credible scientist believes life arose from proteins. Some of the many problems with the Miller-Urey experiment that textbooks seldom mention are listed in Appendix 2.

Harold Urey employed his intelligence and training as a chemist in order to artificially design his experiment to ensure that it would predictably yield amino acids. If he had actually produced life (which he obviously could not do) all that it would prove is that it takes intelligence to create life (see cartoon).



Stanley Miller died in 2007. Close to the time of his death, Miller reflected on his career as an origin-of-life researcher and humbly confessed, “*The problem of the origin of life has turned out to be much more difficult than I, and most other people envisioned.*”⁷ His graduate professor, Harold Urey, expressed similar dissatisfaction with his life’s work saying,

“All of us who study the origin of life find that the more we look into it, the more we feel it is too

7. Kotz J.C., Paul M.T., Gabriela C.W., *Chemistry & Chemical Reactivity*, Thomas Learning Inc., p.140, 2006.

*complex to have evolved anywhere. We all believe as an article of faith that life evolved from dead matter on this planet. It is just that its complexity is so great, it is hard for us to imagine that it did.*⁸

The RNA World Hypothesis

The Miller-Urey experiments (and similar efforts) are actually red-herring experiments. No origin of life scientist today believes life started with proteins. The “protein-first” origin-of-life models were abandoned, for many reasons, long ago. Chief among them are the problems of: a) replication (proteins cannot reproduce themselves); and 2) overcoming the statistical impossibility of randomly forming even one functional protein (thousands of just the right proteins are needed for life). There is more to life than just having the right materials – what is needed is a set of specifications to assemble a functional, living cell. Aware of this, origin-of-life researchers have recognized the missing ingredient is not biochemicals, but is *information*. Not only is genetic information essential for encoding and assembling the precise amino acid sequences that yield thousands of types of functional proteins, information is required to direct virtually everything that is happening inside the cell.

Since biological information storage is the role of DNA, one might naturally suggest life started with DNA instead of proteins. The problem is, DNA, like protein, consists of strings of molecular sub-units that encode information (the subunits being like alphabetical letters in a message). While amino acids are the letters that make up proteins, nucleotide bases (A, G, T, and C) are the letters that make up DNA. So again you run into the problem of having to overcome an impossible statistical barrier – in this case, the odds of forming even one string of DNA with sequence-specific, functional information. Even if this was not a problem, there would still be the “chicken or the egg problem” of which came first – DNA or protein? DNA by itself is dead and useless without the help of a host of proteins (i.e., polymerases, transcription factors, activators, ribosomes, etc.). These proteins enable the replication of the DNA and the “reading” of the DNA – in order to translate the information into proteins. So you need protein to read the DNA in order to make proteins, but you can’t have proteins without the DNA information that specifies them. You can’t have one without the other. This raises the question of which came first: the protein (to read and replicate the DNA) or the DNA (to encode the proteins)? A computer may be used as an appropriate analogy. You cannot have a working computer without the software/programming (think DNA information) and the software is useless without the hardware (think proteins) to utilize it.

To solve this riddle, evolutionists have been forced to devise a third model – the hypothesis that life arose from an imaginary “RNA World”. RNA molecules (similar to DNA but less stable) can store information like DNA molecules (software) and in some very limited ways can act like proteins (hardware). Benjamin Cummings’ *Biology* textbook describes the hoped for significance of RNA’s dual functionality writing,

“The first genetic material was most likely RNA, not DNA. RNA plays a central role in protein synthesis, but it can also function as an enzyme-like catalyst. Such RNA catalysts are called ribozymes. Some ribozymes can make complimentary copies of short pieces of RNA, provided that they are supplied with nucleotide building blocks. ... Thus, life as we know it may have been preceded by an “RNA World,” in which small RNA molecules were able to replicate and store genetic information about the vesicles that carried them.”⁹

8. Urey, Harold C. Quoted in *Christian Science Monitor*, January 4, 1962, p.4.

9. Reece, J.B.; Urry, L.A.; Cain, M.L.; Wasserman, S.A.; Minorsky, P.V.; Jackson, R.B.. *Campbell Biology* (10th Edition) (Page 522). Benjamin Cummings. Kindle Edition, 2014.

Could it really be that life started with what textbooks refer to as “self-replicating” RNA molecules within an “RNA World”? On the surface this may sound like a promising solution, but it fails for many reasons. First, no “self-replicating RNA” has ever been observed or created, as will be discussed in the next section. Second, a self-replicating RNA system requires a pre-existing “RNA world”, which is purely imaginary, and would never arise, for various reasons summarized below.

- a) There is no evidence for an RNA world. It is an imagined world based upon pure conjecture.** The RNA World hypothesis requires countless just-so stories to overcome numerous insurmountable chemical barriers that textbooks conveniently ignore. Meanwhile, experts in the field openly acknowledge the theory is seriously flawed. As chemistry professor, Robert Shapiro writes, “[The RNA World hypothesis] *must be considered either a speculation or a matter of faith.*”¹⁰
- b) RNA molecules do not arise naturally.** At Harvard University’s annual Origin of Life Initiative, a leading origin-of-life theorist James Shapiro explained, “*The odds against [RNA forming on its own] are astronomical.*”¹¹ There are immense difficulties with synthesizing the RNA building blocks (nucleoside bases) that make up RNA strands, difficulties with concentrating enough of them together in one place, difficulties in keeping the molecules protected from cross interacting molecules, difficulties in protecting them from harmful UV radiation, difficulties with organizing the nucleosides into their correct orientation and close enough so they can link up, difficulties in maintaining a constant energy supply to form the chemical bonds between the nucleosides to assemble the RNA strands, difficulties in getting meaningful (functional, information-carrying) sequences of nucleotides, and more.¹²
- c) RNA molecules are unstable and readily break apart.** An obvious problem for the RNA World hypothesis is that RNA is extremely fragile and breaks down very quickly. Somehow RNA would need to continuously be forming faster than it was degrading. As a rescue device, researchers speculate that a more stable type of nucleic acid (an “RNA-like” molecule like PNA, TNA, or GNA) emerged first, before switching over to an RNA-based genetic system. Such molecules have never been shown to exist in nature – they were invented as an *ad hoc* solution to rescue the theory. Researchers in this area acknowledge, “*We do not know how the transition from an RNA-like to an RNA world was made... somehow the genetic material took on more and more of the character of RNA without forsaking its past evolutionary accomplishments.*”¹³
- d) There is no physical environment that can substitute for the complex and directed processes that happen within the cell.** In an attempt to address these issues, a hypothetical “clay substrate” (simply a very fine mud) is sometimes invoked to serve as an “RNA breeding ground”.¹⁴ It is theorized that RNA nucleosides might bind to clay particles, which might slow their degeneration, concentrate them, and order them so they might link up to form longer RNA strands. To support this idea, Biochemists J. Ferris and G. Ertem from Rensselaer Polytechnic Institute conducted what is known as the “Montmorillonite Clay-catalyzed Synthesis of RNA” experiment.¹⁵ They were able to show that without a clay substrate, RNA strands consisting of

10. Strobel L., *A Case for a Creator*, Zondervan, Grand Rapids, Michigan, 2004, p. 231. Lee Strobel interviews Shapiro.
11. Powell, A., NYU chemist Robert Shapiro decries RNA-first possibility, *Harvard Gazette*, 2008. Accessed 11/18/14: <http://news.harvard.edu/gazette/story/2008/10/nyu-chemist-robert-shapiro-decries-rna-first-possibility/>
12. Bernal J.D., *The Physical Basis of Life*, London: Routledge and Kegan Paul, 1951.
13. Joyce G.F., RNA evolution and the origins of life, *Nature* 338:217-224, 1989.
14. Ricardo A. and Szostak J.W., Life on Earth, *Scientific American*, Sept. 2009.
15. Ertem G. and Ferris J.P., Synthesis of RNA oligomers on heterogeneous templates, *Nature* 379: 238-240, 1996.

2-40 nucleotide building blocks were able to link together, but with clay particles assisting the reaction strands formed that were slightly longer (i.e., up to 50 nucleotide long). All the clay substrate did was to enhance the reaction to allow the formation of *slightly* longer RNA strands. This is not very impressive considering the fact that just a single bacterial gene requires a very specific sequence with on average 1,000 nucleotide bases. More importantly, the experimenters pre-primed the RNA building blocks with a phosphate group (a process known as phosphorylation) to act as a type of “glue” so they could artificially enable the linking together of single nucleotides into longer RNA strings. As biochemists, they understood that nucleoside bases cannot organize themselves into RNA chains without these very specific high-energy bonds, which would not arise spontaneously. This type of bond (called a phosphodiester linkage) requires other complex molecules and extremely sophisticated metabolic pathways. Put simply, you need a fully formed cell to make these complex molecules (which obviously did not exist on the so-called “prebiotic” earth). Apart from this artificial phosphorylation (and many other contrived features that were designed by intelligent chemists), nucleotide bonds simply do not arise spontaneously to form RNA chains. Instead, the natural tendency is for RNA chains to break apart and degrade. The clay-catalyst experiment was contrived and failed to demonstrate how RNA could be synthesized faster than it would degrade in a pre-biotic context. Intelligent biochemists were required to force the direction of the reaction against its natural tendency to degrade. Finally, all such experimentally produced RNA chains were random and biologically inert (so they did not encode any information or any biological functions).

- e) An RNA World cannot exist without a “pre-RNA World” to create the necessary conditions.** Not only are there countless obstacles to forming an RNA world, there are just as many obstacles to forming a “pre-RNA world” (keep in mind both worlds are purely theoretical). Interestingly, Gerald Joyce, the origin of life researcher who developed the RNA “self-replicating” system (see below) published a scientific paper in *Nature* highlighting the many chemical obstacles to forming a hypothetical pre-RNA world. A few of these immense problems are summarized in Appendix 3.

Self-Replicating RNA Molecule?

Textbooks ignore the numerous problems in forming a hypothetical pre-RNA world, and jump right to the hypothetical RNA World. They presume that somehow the oceans were filled with RNA, and from that starting point, they present the claim that RNA molecules started to “*self-replicate*”. Textbooks describe the famous “self-replicating RNA enzyme” experiment conducted by origin-of-life experts, Tracey Lincoln, Gerald Joyce, and others. Benjamin Cummings 10th edition writes, “*Natural selection on the molecular level has produced ribozymes capable of self-replication in the laboratory.*”¹⁶ Is this actually true? When we examine these claims, they prove to be highly deceptive.

Life is not life unless it can replicate itself, and genetic information is always and forever lost unless it replicates and is passed on to the next generation of cells. Joyce and colleagues claim they have solved this replication problem.^{17,18} They claim that RNA can spontaneously form into a self-replicating system without the need for proteins. Even if this were true, it would only suggest how RNA arose, not how life arose. But when their work is carefully examined, it is clear that what they engineered does not, in fact,

16. Reece, J.B.; Urry, L.A.; Cain, M.L.; Wasserman, S.A.; Minorsky, P.V.; Jackson, R.B., *Campbell Biology* (10th Edition) (Page 522). Benjamin Cummings. Kindle Edition, 2014.

17. Lincoln T.A. and Joyce G.F., Self-sustained replication of an RNA enzyme, *Science* 323:1229-1232, 2009.

18. Robertson M.P. and Joyce G.F., Highly efficient self-replication RNA enzyme, *Chem. Biol.* 21(2): 238-245, 2014.

show any self-replication of any RNA molecule. Their scheme is entirely artificial and like the Miller-Urey experiment, has no real bearing on the origin-of-life issue. Joyce and colleagues chose to use ambiguous terminology that can easily be taken the wrong way. Perhaps unwittingly, textbook authors and popular science writers have described the experiment using the following misleading terms: “spontaneous”, “replication”, “ligation”, “enzyme”, “self-sustaining”, “self-evolving, and “natural selection.”

- a) ***Spontaneous?*** No aspect of their experimental system could occur apart from intelligent design. There is no natural environment or circumstance where this system could have arisen “spontaneously” or “naturally”. They used an artificial environment favorable for stabilizing RNA, and filled this environment with a high concentration of six very carefully designed RNA molecules, every one of which was artificially synthesized.
- b) ***Self-sustaining?*** The chemical reaction they engineered was not in any way self-sustaining. Four artificially designed and synthesized short RNA molecules (products of human intelligence), had to be continuously fed into the system. As soon as human agency ceased, the reaction ceased. The four short RNAs, which were artificially designed to partially zip together, combined to give rise to two longer molecules, which were dead-end molecules – they could only act as templates, but themselves could not replicate. None of the six RNA molecules could actually reproduce itself.
- c) ***Self-replicating?*** As stated, none of the six types of RNA could self-replicate, nor could the whole system replicate itself. The entire system of the six RNAs could only cause the four shorter molecules to combine, creating additional copies of the two longer strands. There was no RNA polymerization happening (the process that occurs in cells to replicate genetic material). None of the RNA molecules could make a daughter molecule, which would make another daughter molecule. There was no genuine replication at all.
- d) ***RNA Ligation Enzyme?*** The terms replication and the term ligation describe very different reactions, but seem to have been deliberately confounded. Ligation requires a special enzyme that creates a high-energy phosphate bond, linking two nucleic acid chains together. It is like using super-glue to join two ropes end-to-end. This requires three things – two ropes, super-glue, and a mechanism for aligning the two ends with each other. In their artificial system, longer RNA molecules are acting as templates, not enzymes – they just help align the “rope ends”. The shorter RNAs are artificially synthesized “ropes”. When these short RNAs were artificially synthesized, they were created with high-energy phosphate bonds at their ends, which enabled chemical bonding (“super-glue”). So the RNA template did the aligning, but not the ligation. Is it honest to say that longer RNA templates are truly enzymes? Is the term “ligation” being used in its normal sense? Regardless of the use of these terms, ligation is NOT the same as replication.
- e) ***Self-evolving?*** In a recent paper (2014, see ref. 18), Robertson and Joyce claim they have shown “directed evolution” of their artificial RNA system, making it “self-evolving”. How can something be called “self-evolving” when it is undergoing a process that is specifically directed and designed by scientists? The researchers engineered the experiment so that they could systematically synthesize and test slight variations of their sets of RNAs in order to fine-tune their system. These slightly modified RNA sequences were able to align, link together, and then separate to repeat the process at a faster rate than Joyce’s previous system (2009, see ref. 17). This involved a carefully designed and implemented trial and

error process. These authors mislead their readers when they describe this as a “self-evolving” RNA enzyme. It is designed fine-tuning. There is no true replication, and so no true “evolution”. This is very deceptive.

- f) **Natural Selection?** Natural selection has been used to describe the self-replicating system modeled by these researchers (ref 16.). Natural selection is a misleading term because it implies the system is evolving and improving on its own. At best, all that is occurring is *directed* selection. Intelligent chemists carefully designed variant RNA strands to fine-tune the system. The designed variants were mixed together with the RNA template strands. Some variants were able to align with the template strands quicker than other variants. Those that aligned quicker “outcompeted” the other strands – that is all. There was no true replication and therefore no true natural selection taking place.

In summary – the claim of self-replicating RNAs is not only incorrect, but appears to involve deliberate distortion of terminology and numerous misrepresentations of what was actually happening in those experiments. As prominent origin of life researcher Robert Shapiro bluntly puts it, “*Any abiotically prepared replicator before the start of life is fantasy.*”¹⁹

Metabolism-First Hypothesis

There is a new alternative to the RNA-first hypothesis, which is the metabolism-first hypothesis. Proponents of the metabolism-first model believe that the environment alone is sufficient to create and sustain a “*soup of organic building blocks that could have given rise to other biomolecules*”, which could then *somehow* self-assemble into the first living cell. In essence, what they are proposing is that the environment itself (such as hydrothermal vents or mineral surfaces) can be capable of simulating cellular processes that are essential to life – *without* needing enzymes or replication systems. How close have researchers come to demonstrating whether or not this is possible? So far, it is purely theoretical. No such systems have ever been observed in nature. Metabolism-first models, like the RNA-world hypothesis, fail to explain how even the most fundamental building blocks of life (amino acids, nucleic acids, and lipids) can form and be maintained. Origin-of-life researchers in the journal *Science* acknowledge,

*“Various metabolic reaction schemes have been proposed and investigated [e.g., hydrothermal environments, metal catalysts], but none have been demonstrated to be autocatalytic. Nor are there any empirical indications that this is even possible in a pre-biotic context.”*²⁰

Undirected Panspermia Hypothesis

There are several panspermia hypothesis models, including comet²¹ and meteorite theories.²² Many origin-of-life scientists now understand that the hypothetical pre-biotic earth could never establish a

19. As quoted in, Powell, A., NYU chemist Robert Shapiro decries RNA-first possibility, *Harvard Gazette*, 2008. Accessed 11/18/14: <http://news.harvard.edu/gazette/story/2008/10/nyu-chemist-robert-shapiro-decries-rna-first-possibility/>

20. Bada J.L. and Lazcano A., Some like it hot, but not the first biomolecules, *Science* 296:1982-1983, 2002.

21. Patel B.H., *et al.*, Common origins of RNA, protein and lipid precursors in a cyanosulfidic protometabolism, *Nature Chemistry* 7: 301-307, 2015.

22. Scientist Suggests Comet and Meteorite Impacts Made Life on Earth Possible - See more at: [http://www.astrobio.net/topic/solar-system/meteoritescomets-and-asteroids/scientist-suggests-comet-and-meteorite-impacts-made-life-on-earth-possible/](http://www.astrobio.net/topic/solar-system/meteoritescomets-and-asteroids/scientist-suggests-comet-and-meteorite-impacts-made-life-on-earth-possible/#sthash.SoE6UyWG.dpuf)

self-sustaining metabolic system capable of producing the biochemicals necessary for life. So where can origin-of-life scientists go? Remarkably, they look to outer space. For example, Patel *et al.* (ref. 21) claim comets carrying certain precursor molecules can help jump-start spontaneous generation (undirected panspermia theory). But this is shameless speculation and is not even helpful. Even if comets carried all of the necessary biomolecules to earth, it would not get us any closer to life. Assembling the countless individual component parts of the cell is a much greater challenge than simply producing the “right ingredients”. The hypothetical first living cell (LUCA) had to be almost unfathomably complex, with vast numbers of molecules, systems and processes all coming together spontaneously in the same point in time and space. The bare essentials required to produce the most rudimentary living/reproducing cell is incalculable.²³ But even then, there is still a missing “key ingredient”, which is biological *information*. Information cannot arise spontaneously from inanimate matter. Without biological information self-assembly is futile (see next section).

Evolutionists now widely acknowledge that remarkable complexity must have existed *right from the beginning*.²⁴ Naturally this has forced origin of life researchers to puzzle over how astoundingly complex life forms could have arisen so suddenly. According to evolutionary timescales, the earth formed about 4.5 billion years ago. Shortly after, there was a massive bombardment of meteors (between 4 – 3.8 billion years ago), which would have sterilized the planet. Evolutionists suggest the earth would not have been hospitable for life until at least 3.8 billion years ago. Yet, the fossil record’s earliest microbial life forms (cyanobacteria and algae which form distinct layered structures called stromatolites) extend as far back as at least 3.5 billion years ago. These earliest fossilized bacteria appear identical to their modern counterparts. This means fully developed, complex microbial life forms would have had to arise almost as soon as the earth was habitable. In the *Proceedings of SPIE*, evolutionists confess this seemingly miraculous spontaneous origin of life stretches credulity.²⁵ Prominent origin of life researcher, Gerald Joyce, in the journal *Nature* acknowledges this problem writing,

“Perhaps the most surprising aspect of the origins of life on Earth, other than the fact that it happened at all, is that it happened so quickly. ... The time window for biogenesis, from organic chemistry to a primitive cell, seems to be ‘only’ about 0.4×10^9 years.”²⁶

Researchers are wondering how extraordinarily complex microbial life forms like cyanobacteria could have arisen, fully equipped with major metabolic processes and sophisticated photosynthetic capabilities, in relatively short geological time. This becomes especially embarrassing in light of additional evidence of carbon-fixing bacteria (modern cellular metabolic processes) originating even earlier – very early in earth history (approximately 3.8 billion years ago). How could these complex microbial life forms arise spontaneously in a tiny slice of geologic time? It is for these reasons that a growing number of evolutionists are looking for answers in outer space – meteors, comets, extrasolar planets – to accomplish what would have been impossible in a newly-formed earth. Texas Tech University’s paleontologist, Sankar Chatterjee, is one such scientist who believes meteors carrying organic molecules helped kick start the origin of life on earth after a meteor impact. Chatterjee describes

23. Quoted from interview with microbiologist Richard Strohmman in *From Naked Apes to Superspecies: Humanity and the Global Eco-crisis*, by Suzuki D. and Dressel H., Greystone Books, Vancouver BC, 2004. See full quotation in Appendix 1.

24. Takeuchi, N. and Hogeweg, P., Evolution of complexity in RNA-like replicator systems, *Biology Direct* 2008, 3:11doi:10.1186/1745-6150-3-11

25. Hoover, R.B., et al. (eds), *Astrobiology and Planetary Missions*, Proc. of Molecular biologists and cell biologists are revealing to us a complexity of life that we have never dreamt was there. We’re seeing connections and interconnections and complexity that is mindboggling. It’s stupendous. It’s transcendental. It means that the whole science is going to have to change.” Vol. 5906, 59060P, (2005); doi: 10.1117/12.625556.

26. Joyce G.F., RNA evolution and the origins of life, *Nature* 338:217-224, 1989.

his pet theory with great optimism in a video interview claiming, “[The spontaneous origin of life] *might have happened in only 200 million years, which is in geological time, an instant. The reason it was so quick is because, you see, the major ingredients came from space.*”²⁷ Unlike the Miller-Urey “protein-first” origin-of-life model and “RNA World” hypothesis, Chatterjee claims both proteins and RNA emerged simultaneously. He acknowledges this is only assumed out of necessity – to compensate for the other model’s shortcomings. His theory is not based on any actual evidence of life arising spontaneously – it is pure speculation. Chatterjee’s meteorite theory includes the many unresolved problems of the “protein-first” origin of life models as well as the “RNA World” hypothesis. In addition, the model includes a series of its own unique problems.

Chatterjee speculates that a meteor carrying organic compounds (RNA, proteins, sugars, phosphates, and fatty acids to form a membrane) collided with earth to form a crater lake that could act as a “crucible” for the pre-biotic chemical reactions to take place in. He insists the impact of the meteorite split open the earth’s crust to form an enormous hydrothermal vent. The hydrothermal vent is conveniently invoked out of necessity to generate heat and create convection current that could “churn” the water to assist key chemical reactions. Chatterjee’s theory could never be experimentally validated; it has only taken place in his imagination. No experiment could demonstrate anything even remotely close to what he is proposing (*Science*, 2002). As a paleontologist (not a biochemist), Chatterjee oversimplifies the seemingly endless chemical challenges that need to be overcome in order for life to spontaneously form. He naively assumes that all you need are the right chemical ingredients and life will just happen. What he fails to recognize is that life is more than just the sum of its parts. If a scientist were to bottle up all of the ingredients necessary for life in a salt-sterile solution, churned by convection current, a living organism would never spontaneously arise. It would be an embarrassment to biochemists to even *consider* conducting such an experiment. The “right ingredients” can never be sufficient. What is missing is *prescriptive information* (programming). Information is essential to specify the production and assembly of organic compounds into a highly organized living system. Life requires encoded information to specify life’s energy, manufacturing, replication, waste-disposal, transport, membrane systems, metabolic pathways, etc., that all operate synergistically. There is no way this can happen in a crater basin or a hydrothermal vent. As origin-of-life researchers Jeffery Bada and Antonio Lazcano note in *Science*,

*“Life as we know it consists of both chemistry and information. If metabolic life existed on the early Earth, converting it to life as we know it would have required the emergence of some type of genetic information system. ... metabolic life could not have evolved in the absence of a genetic replication mechanism ensuring the maintenance, stability, and diversification of its components.”*²⁸

The meteorite theory necessitates layer upon layer of extremely unlikely geochemical events that all must occur in tandem. Even assuming all the necessary events come together and a genetic replication system somehow forms with all the right proteins, the emergent cells (vesicles) would still have to “learn” how to divide. Physical prodding may accidentally cause the vesicles to “bud-off” but this in no way ensures that the genetic information is duplicated and neatly encapsulated within the “daughter” vesicles. How then can the genetic information be transmitted to the next generation to keep life going? The only way this could occur is through the extremely sophisticated process of cellular division (binary fission). The circular DNA of the cell first needs to be replicated; it then has to be relocated to each of the poles of the cell; the cell must then lengthen to prepare for division, and finally the equatorial plate

27. Interview with Sankar Chatterjee: <https://www.sciencedaily.com/releases/2013/10/131029133124.htm>
Video interview available on YouTube: <https://www.youtube.com/watch?v=xEfvL2oTPrl>

28. Bada J.L. and Lazcano A., Some like it hot, but not the first biomolecules, *Science* 296:1982-1983, 2002.

has to constrict and separate the plasma membrane to ensure that each cell has identical genetic material. All of these steps involve a tightly controlled process, requiring a host of proteins and other complex bio-machinery to separate the genetic material and divide the cell. A fatty acid vesicle is simply a container – it is light years away from being able to undergo the tightly controlled process of cellular division.

The endless complications that come with Chatterjee's meteorite theory reveal the absolute necessity of having *biological information* from the very beginning. Without biological information there can be no sustained protein formation; no sustained RNA production; no sustained replication; no sustained metabolic activity; no cellular communication systems; no waste disposal system; no intercellular transportation system; no cell division, etc. – the spontaneous origin of life becomes utterly impossible. What is most fascinating is that information theorists have found that information is a *non-material* entity. This means it cannot originate by itself in matter. Norbert Wiener, MIT professor of mathematics and the father of cybernetics wrote, "*Information is information, neither matter nor energy.*"²⁹ All known information systems have been shown to originate from an intelligent source (i.e., software comes from a software programmer), and never via random processes. This applies to all types of information, including all the information that had to be there from the moment life began (see Appendix 2 for more on information theory and the origin of biological information).

Life is More than the Sum of its Parts

What if one of these origin-of-life stories was true? What if *all* of them were true? Suppose RNA nucleotides arose spontaneously and assembled themselves into RNA chains, which filled the oceans and gained the ability to self-replicate. At the same time, suppose amino acids arose spontaneously and assembled themselves into proteins, which also filled the oceans. And suppose DNA somehow arose spontaneously, as did membranes (lipids). Let's even suppose that all the other biochemicals required for life were being continuously imported from outer space. If the oceans were full of random RNAs, DNAs, proteins, other biomolecules, and membranes – then what would be the probability of a living cell spontaneously arising? The answer is still zero chance.

A living cell is irreducibly complex – the multitude of components and systems must all be in place and operating from the very beginning. If any one essential part of the system is absent, everything else will fall apart like a house of cards. To think that having all the components of life present brings us closer to spontaneous life is like thinking that having a pile of silicon, plastic, copper, brings us closer to having spontaneous computers. The cell's information systems (hardware, software, and language systems) require masterful design and engineering. Information systems are the most diagnostic element of life and are found in DNA, RNA, protein, membrane, and signaling systems. The intellectual bankruptcy of the spontaneous origin-of-life field is most easily seen in the fact that the leading theories do not even try to address how the first cell might have come together. Instead, the best they can do is to merely speculate on how a handful of biomolecular building blocks might have conceivably arisen.

Patel *et al.* published a recent paper in the journal *Nature Chemistry*.³⁰ Their findings allegedly solved the classic origin-of-life "chicken-and-egg" problem (what came first, DNA or proteins)? The researchers explain they allegedly solved this "*evolutionary conundrum*" by producing a single set of chemical

29. Wiener N (1968) *Cybernetics: or the control and communication in the animal and the machine*. Technology Press, MIT.

30. Patel B.H., *et al.*, Common origins of RNA, protein and lipid precursors in a cyanosulfidic protometabolism, *Nature Chemistry* 7: 301-307, 2015.

reactions “that could give rise to most of life’s building blocks simultaneously.”³¹ It turns out they accomplished next to nothing, hardly an improvement from the now abandoned Miller-Urey experiment. An organic chemist (anonymous) responded to the claims put forth by Patel *et al.*, stating,

*“At the end of the day, as with the Miller-Urey experiment, all we have is a pot of precursor compounds, no amino acid polymers or proteins: no short chains of nucleotides (sugar + base + phosphate), so not even a hint of a start at building RNA or DNA chain; no long chain fatty acids so no triglycerides or cell membranes. Just a slightly more complete pot of pre-biotic soup. So, sixty-some years after the Miller-Urey experiment, we are just a little bit closer to the complete mix of monomers but not one step closer to building any of the bio-polymers so essential to a working, living cell.”*³²

Even granting all the biochemicals necessary for life were somehow made available in sufficient quantities and protected from degradation, it still would not matter. The bottom line is, cells never self-assemble even with all the necessary biochemicals present. A more thorough response to the claims made by Patel *et al.* is available [here](#) (see ref. 32).

Directed Panspermia Hypothesis

In 1953 James Watson and Francis Crick from Cambridge University discovered the DNA double helix. Nearly a decade later, Crick managed to “crack” the genetic code. He recognized that proteins are synthesized based on the information encoded in the DNA. More specifically, he found that there are 64 DNA triplets (called codons) that specify the 20 different amino acids that are necessary to form functional proteins. Put simply, Crick deciphered the DNA-protein relationship – the “alphabet” of the genetic code. Today, the language system of the genetic code is represented by the “Standard Codon Table”. The Standard Codon Table may be more easily understood as the “universal genetic code”. It is the fundamental language system shared by all living creatures.

The universal genetic code is not evidence we all evolved from a single common ancestor. By comparing the DNA sequences among living creatures, evolutionists have proposed that life originated from *multiple* primordial life forms rather than the traditional view of a single ancestral life form. To envision this, picture Darwin’s Tree of Life with multiple trunks instead of just one. This idea was publicized in *New Scientist*, *Scientific American*, and is currently represented in textbooks. Thus, from an evolutionary perspective there are reasons to believe there should have been numerous different genetic codes – not just one. Another reason why evolutionists have suggested multiple “primordial” genetic codes has to do with the fine-tuning of the Standard Codon Table. Strict evolutionary naturalists believe life had a random beginning. The last thing they expected to find is a genetic code that appears to be masterfully crafted. Indeed, this is just what is found. Experts in the field universally acknowledge the Standard Codon Table is highly optimized – they refer to it as “*the best of all possible codes*”.³³ After deciphering the Standard Codon Table, Francis Crick believed the genetic code formed by pure luck – he called it a “*frozen accident*”. But what he failed to explain was how a highly optimized genetic code (instead of the vastly more numerous and more likely non-optimal possibilities) could have arisen spontaneously by chance? Distinguished evolutionary computational biologist, Eugene Koonin, refers to this evolutionary dilemma as “*the universal enigma*”. Aware of this problem, various researchers have attempted to make

31. Service R.F., Researchers may have solved origin-of-life conundrum, *Science Magazine*, March 16, 2015. Accessed May 22, 2016; <http://www.sciencemag.org/news/2015/03/researchers-may-have-solved-origin-life-conundrum>

32. Casey, L., “Solution” to an Origin of Life Puzzle Highlights the Need for Careful Planning by an Intelligent Investigator, *Evolution News and Views*, March 23, 2015.

33. Freeland S.J., Is Ours the Best of All Possible Codes? Evolution as Computation, Part of the series *Natural Computing Series*, pp. 125-139; http://link.springer.com/chapter/10.1007%2F978-3-642-55606-7_6

this situation seem more plausible. Some researchers have suggested there were multiple primordial genetic codes that competed with one another. According to the story, one surviving code managed to outperform the others to become the currently established universal genetic code. Freeland and Hurst believe a scenario like this must have occurred. They report in the *Journal of Molecular Evolution*, “*The genetic code is one in a million.*”³⁴ Is it reasonable to believe that life with its astounding complexity spontaneously arose a million times as totally independent events (each with their own different genetic codes), when there is no plausible scenario for how this could have happened even once?

In the published proceedings, *Biological Information – New Perspectives*, biophysicist Jed Macosko addresses in greater detail numerous additional problems with the reputed spontaneous origin of the Standard Codon Table (available online at BINP.org).³⁵ He shows that the establishment of the genetic code was certainly not a “frozen accident”. In his paper Macosko examines how random chemical reactions might overcome the incredible odds of spontaneously forming a near-perfect genetic code. In answering this question, he quotes Koonin who resorts to the multiverse hypothesis – which assumes (without any evidence) that our universe is one of an infinite number of parallel universes. In light of this highly imaginative scenario, Koonin confidently asserts that the “*emergence of highly complex systems [i.e., the genetic code] by chance is inevitable.*”³⁶ Commenting on Koonin’s unwavering faith in naturalist philosophy, Macosko responds, “*An appeal to an infinite multiverse, which has never been nor can ever be observed, is a poor way to rescue the chance hypothesis from overwhelmingly low probabilities.*”³⁷

Francis Crick understood the immense difficulties of forming the Standard Codon Table through purely naturalistic processes. He knew it could not possibly form by chance alone. And so out of desperation, he resorted to *directed panspermia*. Directed panspermia is the belief that aliens from some other stars or galaxies “seeded” life on earth.^{38,39} When Crick discovered the structure of the DNA double helix he was astonished by its sophistication and elegance. As a committed evolutionist, Crick was distraught over this. He immediately recognized that the unmistakable elegance of the genetic code suggested intelligent design. Crick refused to consider the existence of the supremely intelligent Creator-God. So, instead, he resorted to “directed panspermia” (the hypothesis that life was planted on earth by aliens from distant stars. Numerous other scientists have since recognized the design of life and have come to similar conclusions. Distinguished theoretical physicist and mathematician, Freeman Dyson, wrote recently,

“The origin of life is the deepest mystery in the whole field of science. Many books and learned papers have been written about it, but it remains a mystery. There is an enormous gap between the simplest living cell and the most complicated naturally occurring mixture of nonliving chemicals. We have no idea when and how and where this gap was crossed. We only know that

34 Freeland SJ, Hurst LD (1998) The genetic code is one in a million. *J Mol Evol* 47(3): 238–248.

35. Macosko J.C. and Smelser A.M., An Ode to the Code: Evidence for Fine-Tuning in the Standard Codon Table, In: Marks II RJ et al., (eds) *Biological Information – New Perspectives*, 2013, pp. 418-434.

36. Koonin EV, (2007) The cosmological model of eternal inflation and the transition from chance to biological evolution in the history of life. *Biol Direct* 2:15.

37. Macosko J.C. and Smelser A.M., An Ode to the Code: Evidence for Fine-Tuning in the Standard Codon Table, In: Marks II RJ et al., (eds) *Biological Information – New Perspectives*, 2013, pp. 418-434.

38. History of directed panspermia, panspermia-theory.com/directed-panspermia, 2009.

39. Bates comments on Crick’s alien-hypothesis writing, “To overcome the huge hurdles of evolution of life from non-living chemicals on earth, Crick proposed, in a book called *Life Itself*, that some form of primordial life was shipped to the earth billions of years ago in spaceships—by supposedly ‘more evolved’ (therefore advanced) alien beings.” <http://creation.com/designed-by-aliens-crick-watson-atheism-panspermia#r4>

*it was crossed somehow, either on Earth or on Mars or in some other place from which the ancestors of life on Earth might have come.*⁴⁰

Famed atheist Richard Dawkins was forced to come to a similar conclusion when challenged by Ben Stein in the movie *Expelled*.⁴¹ Here is a short excerpt from the interview. Notice Dawkin's desperate appeal to an unknown "designer" from "somewhere in the universe", "sometime earlier" as an explanation for life's origin.

BEN STEIN: "What do you think is the possibility that Intelligent Design might turn out to be the answer to some issues in genetics or in evolution?"

DAWKINS: "Well, it could come about in the following way. **It could be that at some earlier time, somewhere in the universe, a civilization evolved**, probably by some kind of Darwinian means, probably to a very high level of technology, and **designed a form of life** that they seeded onto perhaps this planet. Now that is a possibility, and an intriguing possibility. And I suppose it's possible that you might find evidence for that if you look at the details of biochemistry, molecular biology, you might find a signature of some sort of designer [emphasis added]."

For Francis Crick, Richard Dawkins, and other like-minded scientists, they choose to believe life formed on an unknown planet (possibly designed by little green men), over an unknown period of time, through a series of unknown processes. Then somehow life came to earth, either on a spaceship, or by "surviving millions of years drifting across the cold, airless void... towards our sun with its sterilizing levels of radiation... extreme heat produced from friction with the earth's atmosphere..."⁴² They prefer to believe this rather than to believe in a Creator-God. The Bible spoke of man's obstinate refusal to believe in Him saying, "They deliberately forget that God made the heavens long ago by the word of his command." (2 Peter 3:5, NLT)

Spontaneous Generation – Is it Science or Pseudoscience?

For many decades now, the spontaneous origin of life from non-life has been taught as an unquestionable "fact of science". What type of science are we talking about, that canonizes a dogma that is irrational, untestable, and directly denies one the most fundamental laws of nature? What type of science insists on upholding reckless speculations as if absolute truths?

Real science is based upon the scientific method, which involves observations in the present, development of testable hypotheses that can better explain what is observed, and rigorous, repeatable, experimental testing of such hypotheses. This type of science can be called observational science, or experimental science, or operational science, or empirical science. This is the type of science that gives rise to modern medicine, airplanes, computers, etc. A good definition of observational science can be found in a standard introductory level biology textbook,

*"Scientific inquiry is a powerful way to know nature, but there are limitations to the kinds of questions it can answer. These limits are set by sciences requirements that hypotheses be testable and falsifiable and that observations and experimental results be repeatable."*⁴³

40. Dyson, F.J., *A Many Colored Glass: Reflections on the Place of Life in the Universe*, Charlottesville, VA: University of Virginia Press, 2010, p.104.

41. *Expelled: No Intelligence Allowed*, Premise Media Corporation & Rampant Films, written by Kevin Miller, Ben Stein, and Walt Ruloff, 2008.

42. Carter R. (ed.), *Evolution's Achilles' Heels*. Creation Book Publishers, Powder Springs, Georgia, 2014.

43. Campbell, Neil A.; Reece, Jane B.; *Campbell Biology* (7th Edition) Benjamin Cummings, p.24, 2005.

There is a very small sub-division of science that is called historical science (or forensic science), which involves observing things in the present, and then based upon such observations, attempting to make reasonable inferences about what may have happened in the past. Historical science does not meet the formal definition of true science. The past cannot be observed directly, it is not repeatable, and it is not subject to experimentation. Sometimes historical science can produce credible models about the past, but such inferences are inherently uncertain. The more remote the past event, the less credible is any type of inference. Reckless speculation about how life-less chemicals spontaneously gave rise to life billions of years ago is not observational science, and is not even historical science. In fact, this is not science at all. It is pseudoscience, and when it is embraced with religious zeal – it is actually a faith-based belief system. The leading origin-of-life researchers have repeatedly confessed this. Yet education systems and the media still portray the spontaneous generation of life as if it is scientifically not only defensible, but absolutely true.⁴⁴ Hubert Yockey from the University of California, Berkeley – distinguished physicist and information theorist disagrees with the popular view, and humbly confesses in the *Journal of Theoretical Biology*,

“Research on the origin of life seems to be unique in that the conclusion has already been authoritatively accepted What remains to be done is find the scenarios which describe the detailed mechanisms and processes by which this happened. One must conclude that, contrary to the established and current wisdom, a scenario describing the genesis of life on earth by chance and natural causes which can be accepted on the basis of fact and not faith has yet to be written.”⁴⁵

This article briefly highlights a vast amount of information that shows that belief in the spontaneous generation of life is irrational and unsupportable. Because spontaneous generation was proven false over 100 years ago, and the Law of Biogenesis has never been contradicted, such a belief is actually *anti-science*. The fact that a large body of scientists today not only believe in spontaneous generation, but hold to this view passionately (to the point of ridiculing or silencing those who disagree) – shows that we are talking about a secular religious belief system. There is no viable natural process that can create life. This means there is no better explanation for life than the age-old concept that biological life was designed and was supernaturally created by the living God. This is in perfect agreement with the Law of Biogenesis – life comes from life. Most scientists today find this possibility utterly unacceptable – in other words, they are *willfully ignorant*. They may be free to reject the God who made them, but they should not coerce others, including unassuming students of biology to hold their religious view, or deny others access to the many evidences that falsify their cherished beliefs (see Appendixes 1-4), and that clearly point to the Creator-God of the Bible.

“For since the creation of the world God’s invisible qualities—his eternal power and divine nature—have been clearly seen, being understood from what has been made, so that people are without excuse.” (Romans 1:20, NIV)

44. “Conditions on early earth made the origin of life possible.” Reece, Jane B.; Urry, Lisa A.; Cain, Michael L.; Wasserman, Steven A.; Minorsky, Peter V.; Jackson, Robert B., *Campbell Biology* (10th Edition) (Page xxxviii). Benjamin Cummings. Kindle Edition, 2014.

45. Yockey, H.P., A calculation of the probability of spontaneous biogenesis by information theory, *Journal of Theoretical Biology* 67:377–398, 1977.

Appendix 1 – Renowned scientists acknowledge profound problems with all spontaneous life hypotheses.

Sobering statements like the following ought to be printed in every textbook throughout the nation. At the end of his famous experiment in 1864, Pasteur remarked, *“Never will the doctrine of spontaneous generation recover from the mortal blow struck by this simple experiment.”*⁴⁶ Unfortunately, Pasteur greatly underestimated the hardness of man’s heart. Today, the primitive doctrine of spontaneous generation lives on in student’s textbooks throughout the world. But for the record, let it be known that good observational science has overwhelmingly revealed that life can only come from life, which ultimately must have been originally created by God. Some of these scientists openly confess that in spite of endless attempts to show otherwise, God remains the best explanation for the origin of life.

Franklin M. Harold, Biochemist, *In Search of Cell History: The Evolution of Life’s Building Blocks* (Chicago: University Press, 2014), p.164:

“Over the past sixty years, dedicated and skillful scientists have devoted much effort and ink to the origin of life, with remarkably little to show for it. Judging by the volume of literature, both experimental and theoretical, the inquiry has thrived prodigiously. But unlike more conventional fields of biological research, the study of life’s origins has failed to generate a coherent and persuasive framework that gives meaning to the growing heap of data and speculation; and this suggests that we may be missing some essential insight.”

James Tour, Prominent chemist and Nano-systems engineer at Rice University; *Tera MacIlsac, Epoch Times, Prominent Chemist Says Scientists Don’t Really Understand Evolution, Oct 2 2014; accessed 05-23-16 from: <http://www.theepochtimes.com/n3/995875-prominent-chemist-says-scientists-dont-really-understand-evolution/>*

Dr. Tour was recognized in 2014 as one of *“The 50 Most Influential Scientists in the World Today”*; he is the author of over 500 scientific publications, and the recipient of awards from NASA, Chemical Society, Thomas Reuters, Honda, and others. In answering a question relating to the spontaneous origin of life during a lecture at Georgia Tech, Tour confesses, *“Let me tell you what goes on in the back rooms of science – with National Academy members, with Nobel Prize winners. I have sat with them, and when I get them alone, not in public – because it’s a scary thing, if you say what I just said – I say, ‘Do you understand all of this, where all of this came from, and how this [abiogenesis] happens?’ ... Every time that I have sat with people who are synthetic chemists, who understand this, they go, ‘Uh-uh. Nope.’ ... And if they’re afraid to say ‘yes’, they say nothing. They just stare at me, because they can’t sincerely do it.”*

Eugene V. Koonin, Evolutionary and Computational Biologist, Senior investigator at National Center for Biotechnology Information *The Logic of Chance: The Nature and Origin of Biological Evolution* (Upper Saddle River, NJ: FT Press, 2011), p. 391.

“The origin of life is one of the hardest problems in all of science, but it is also one of the most important. Origin-of-life research has evolved into a lively interdisciplinary field, but other scientists often view it with skepticism and even derision. This attitude is understandable and, in a sense, perhaps justified, given the “dirty” rarely mentioned secret: Despite many interesting results to its credit, when judged by straightforward criterion of reaching (or even approaching) the ultimate goal, the origin of life field is a failure – we still do not have even a plausible

46. Fox S. and Dose K. *Molecular Evolution and The Origin of Life*. New York: Marcel Dekker, 1977.

coherent model, let alone a validated scenario, for the emergence of life on Earth. Certainly, this is due not to a lack of experimental and theoretical effort, but to the extraordinary intrinsic difficulty and complexity of the problem. A succession of exceedingly unlikely steps is essential for the origin of life, from the synthesis and accumulation of nucleotides to the origin of translation; through the multiplication of probabilities, these make the final outcome seem almost like a miracle."

J.T. Trevors, Nano- and molecular events, thermodynamics/entropy, quantum mechanics and genetic instructions, *Journal of Microbiological Methods*, 84:492-495, 2011:

"Science has limits, and origin of life research is one example where observations and experimentation are an immense challenge. Despite the immense, significant advances made in biosciences, there is no agreed-upon plausible hypothesis that has led to a theory with abundant supportive evidence, for the origin of microbial life on the Earth, from a physical, geochemical environment. The origin of life from the inanimate geochemical Earth requires plausible hypotheses with experimentation and observations that are extremely difficult to undertake. Because of the lack of experimentation, most published articles rely upon thought experiments and the human imagination. These types of experiments can lead to excellent hypotheses but also to flawed conclusions, non-plausible hypotheses, assumptions, speculation, and wishful thinking, without any supporting evidence. Origin of life experimentation, especially the origin of the organic, genetic instructions in DNA and RNA, are extremely difficult to conduct. There is still confusion in the scientific literature as the major factors (and mechanisms) required for the origin of life, are not integrated into a plausible hypothesis that has led to an origin of life theory with ample supporting evidence. Experimentation and observations are central to science; however, they are difficult to apply to the origin of life, billions of years ago."

Alonso Ricardo and Jack W. Szostak, Origin of Life on Earth, *Scientific American*, 2009. Ricardo is an origin-of-life researcher and research associate at Howard Hughes Medical Institute at Harvard University. Szostak, is a professor of genetics at Harvard Medical School:

"It is virtually impossible to imagine how a cell's machines, which are mostly protein-based catalysts called enzymes could have formed spontaneously as life first arose from nonliving matter around 3.7 billion years ago." [Note: Despite their admission, these researchers speculate how they think it happened anyways].

Stewart Kauffman, Theoretical Biologist, *At Home in the Universe*, Oxford University Press, 1995:

"Anyone who tells you that he or she knows how life started some 3.4 billion years ago is a fool or a knave. Nobody knows."

J. Roth, Cellular & Molecular Biologist, *Cosmos, Bios, Theos – Scientists Reflect on Science, God, and the Origins of the Universe, Life, and Homo sapiens*, Edited by Henry Margenau, Roy A. Varghese, p. 199, Third Printing, 1992:

"I have carefully studied molecular, biological, and chemical ideas of the origin-of-life and read all the books and papers I could find. Never have I found any explanation that was satisfactory to me. The basic problem is with the original template (be it DNA or RNA) that would have been necessary to initiate the first living system that could then undergo biological evolution. Even reduced to the barest essentials, this template must have been very complex indeed. For this

template and this template alone, it appears it is reasonable at present to suggest the possibility of a creator."

Gordon Mills, Malcom Lancaster, & Walter Bradley, Walter Bradley was a professor of materials science and engineering, and a co-author of *The Mystery of Life's Origin: Reassessing Current Theories*, excerpt from *Origin of Life & Evolution in Biology Textbooks – A Critique, The American Biology Teacher*, Volume 55, No.2, February 1993, p. 78-83; accessed May 22, 2016: <http://www.asa3.org/ASA/education/origins/oolteach-mlb.htm>

These authors point out the inconsistencies and overstatements regarding origin of life theories proposed in standard biology textbooks. They discuss the deceptiveness of the majority of textbooks, which "*exude confidence that confirmation of naturalistic model of life's origin is inevitable.*" They criticize textbooks for "*clinging to outdated atmospheric models*", "*overstating the experimental results*", and "*neglect of the central problem, genetic information.*" An excerpt of their review on the origin of life as commonly presented in textbooks is available at <http://www.asa3.org/ASA/education/origins/oolteach-mlb.htm>

W. Arber, Nobel Prize-winning Microbiologist, *Cosmos Bios, Theos – Scientists Reflect on Science, God, and the Origins of the Universe, Life, and Homo sapiens*, Edited by Henry Margenau, Roy A. Varghese, p. 142, Third printing, 1994:

"Although a biologist, I must confess that I do not understand how life came about. Of course, it depends on the definition of life. To me, autoreplication of a macromolecule does not yet represent life. Even a viral particle is not a life organism, it only can participate in life processes when it succeeds in becoming part of a living host cell. Therefore, I consider that life only starts at the level of a functional cell. The most primitive cell may require at least several hundred different specific biological macro-molecules. How such already quite complex structures may have come together, remains a mystery to me. The possibility of the existence of a Creator, of God, represents to me a satisfactory solution to this problem."

B. O Koppers, Distinguished Biophysicist at University of Jena, Germany, *Information and the origin of life*, Cambridge, MA: MIT Press, 1990, p. 60. Kopper comments on the topic of the chance hypothesis for the origin of genetic information:

"The expectation probability for the nucleotide sequence of a bacterium is thus so slight that not even the entire space of the universe would be enough to make the random synthesis of a bacterial genome probable."

Gerald F. Joyce, RNA evolution and the origin of life, *Nature*, 338: 217-224,1989:

"The question of life's origin is one of the oldest and most difficult in biology. ... The problem is especially difficult because we have no direct evidence of the events that occurred during roughly the first thousand million years of the Earth's history. The oldest rocks that provide clues to life's distant past are 3.6×10^9 [3.6 billion years old] and by that time cellular life seems already to have been well established. Modern organisms are so sophisticated that they furnish little information about what life was like before there was a genetic code and a translation apparatus. Extraterrestrial studies have yet to provide us with an alternative life form for comparison. We are left with only a partial understanding of the origins of life that is based largely on inference and conjecture."

Klaus Dose, The origin of life: more questions than answers. *Interdisciplinary Science Reviews*, 13:348, 1988:

“More than 30 years of experimentation on the origin of life in the fields of chemical and molecular evolution have led to a better perception of the immensity of the problem of the origin of life on Earth rather than to its solution. At present, all discussions on principal theories and experiments in the field either end in stalemate or in a confession of ignorance.”

Hubert P. Yockey, Distinguished physicist and information theorist, A calculation of the probability of spontaneous biogenesis by information theory, *J. Theor. Biol.* 67:377–398, 1977.

“Research on the origin of life seems to be unique in that the conclusion has already been authoritatively accepted What remains to be done is find the scenarios which describe the detailed mechanisms and processes by which this happened. One must conclude that, contrary to the established and current wisdom, a scenario describing the genesis of life on earth by chance and natural causes which can be accepted on the basis of fact and not faith has yet to be written.” “Since science does not have the faintest idea how life on earth originated... it would only be honest to confess this to other scientists, to grantors, and to the public at large.”

Alonso Ricardo and Jack W. Szostak, Origin of Life on Earth, *Scientific American*, 2009; <http://www.scientificamerican.com/article/origin-of-life-on-earth/> Ricardo and Szostak give us a glimpse into the complex world residing inside a single cell:

“Every living cell, even the most simplest bacterium, teems with molecular contraptions that would be the envy of any nanotechnologist. As they incessantly shake or spin or crawl around the cell, these machines cut, paste and copy genetic molecules, shuttle nutrients around or turn them into energy, build and repair cellular membranes, relay mechanical, chemical or electrical messages – the list goes on and on, and new discoveries add to it all the time. It is virtually impossible to imagine how life’s machines, which are mostly protein-based catalysts called enzymes, could have formed spontaneously as life first arose from nonliving matter around 3.7 billion years ago.”

Richard C. Strohman, distinguished professor emeritus of molecular and cell biology at the University of California, Berkeley. Member of the American Society of Cell Biology and the Society for Developmental Biology and a fellow of the American Association for the Advancement of Science:

“Molecular biologists and cell biologists are revealing to us a complexity of life that we have never dreamt was there. We’re seeing connections and interconnections and complexity that is mindboggling. It’s stupendous. It’s transcendental. It means that the whole science is going to have to change.” “We say things are transcendental – that is to say, hopelessly complex.”⁴⁷

Jeremy Walter is a mechanical engineer. He is head of the Engineering Analysis and Design Department within the Energy Science and Power Systems Division at the Applied Research Laboratory (ARL) at Pennsylvania State University:

Walter acknowledges the extreme sophistication of life’s biological machines writing, *“The most basic processes of living things are accomplished by molecular engines as complex as man’s*

47. Quoted from interview with microbiologist Richard Strohman in *From Naked Apes to Superspecies: Humanity and the Global Eco-crisis*, by David Suzuki, Holly Dressel, 2004.

*greatest inventions.*⁴⁸ If the world's brightest engineers require immense effort to build sophisticated nanomachines and advanced technologies like computers, satellites, and NASA space shuttles, how much more so must the far more complex single celled organisms be the product of purposeful design (as opposed to time, chance, and natural processes)? Don't the thousands of examples of biological "nanomachines" that scientists are continually discovering greatly surpass Darwin's description of what he referred to as a "*complex organ ... which could not possibly have been formed by numerous, successive, slight modifications...*"? How could life spontaneously arise with such mindboggling complexity from a "*warm little pond*" in a tiny slice of geologic time through a random series of chemical accidents? How can that be considered reasonable (let alone "scientific" and textbook-worthy) whereas a masterful designer, an intelligent Creator-God, is readily dismissed as preposterous?

For a visual demonstration of the complexity inside a single cell, watch Harvard's "The Inner Life of the Cell" video available at the following link: <https://www.youtube.com/watch?v=wJyUtbn005Y> it's a three minute animated video clip that powerfully reveals just a few of the incredible biochemical processes and molecular machines that are operating inside the cell. Keep in mind it is only an animation, and so it is still a gross oversimplification compared to the complexity of actual living cells.

Appendix 2 – Programmed information is what makes life alive – information only comes from intelligence.

Computer programmers, information theorists, geneticists, and scientists are increasingly acknowledging the *non-material* essence of biological information. These scientists acknowledge the uncanny resemblance of biological information to human information technologies. Biological information is true information – it cannot arise spontaneously through natural process. A few of these scientists are noted below.

1) A prominent theoretical physicist, Paul Davies, acknowledges the problem of not only explaining the origin of such complex biochemical machines from non-living matter, but more importantly, the origin of the prescriptive *information* that encodes them. He explains, "*Life is more than just complex chemical reactions. The cell is also an information storing, processing and replicating system. We need to explain the origin of this information, and the way in which the information processing machinery came to exist.*"⁴⁹

2) Upon completion of the Human Genome Project, former Caltech president and Nobel Prize-winning biologist David Baltimore wrote, "*Modern biology is a science of information.*" He explains further, "*Obviously, life is a chemical phenomenon, but its distinctiveness lies not in the chemistry as such. The secret of life comes instead from its informational properties; a living organism is a complex information-processing system.*"⁵⁰ Indeed! Even the so-called "simplest" living bacteria, *Mycoplasma genitalium*, which consists of the smallest genome size necessary to sustain life yet found (and so it is sometimes considered "simple" – though it is actually as complex as a small city), has 580,070 genetic letters (nucleotide base pairs). This is equivalent to roughly 2 five hundred-page books worth of DNA information. Where could all of this genetically

48. Jeremy L. Walter contributor to the book *In Six Days*, edited by John Ashton, 2009.

49 "The origin of life. II: How did it begin?" *Science Progress*, 2001.

50. Paul Davies, *The Fifth Miracle*, 1999, p. 19.

encoded information come from? To answer this, think in terms of a simpler example first. The information contained within a book did not originate from the ink and paper itself. The pages and molecules of ink do not contain a single iota of information. They are simply the medium that carries or physically represents the message so that it can be read. The actual information ultimately came from the author's mind. Information is a *non-material* entity – meaning, not having its origin in physical matter. As Norbert Wiener, MIT professor of mathematics and the father of cybernetics wrote, “*Information is information, neither matter nor energy.*” Fascinatingly, the same has been found to be true with respect to *biological* information. The genetic information encoded in a cell is not the DNA molecule or nucleotide bases themselves – that is just the physical medium in which the information is carried, processed, and transmitted. In other words, information (whether it's human information or biological information) cannot originate by itself in matter apart from intelligent intervention. Biologists Lester and Bohlin in *The Natural Limits to Biological Change*, acknowledge this writing, “*DNA is an information code The overwhelming conclusion is that information does not and cannot arise spontaneously by mechanistic processes. Intelligence is a necessity in the origin of any informational code, including the genetic code, no matter how much time is given.*”⁵¹

3) The co-founder of Microsoft, Bill Gates, also seems to recognize this. He explains, “*DNA is like a computer program but far, far more advanced than any software ever created.*”⁵² However, because of evolutionary theorist's strict commitment to naturalism (which is really a philosophical dogma, not science) the concept of a non-material origin for biological information is often dismissed. It is these same naturalists who refuse to consider the possibility that biological information might be true information in the sense that it must ultimately come from intelligence. As evolutionary biologist, Richard Lewontin confesses, “*...we cannot allow a divine foot in the door.*”⁵³ To escape this conclusion, DNA information is often compared to other self-ordering systems like a snowflake or salt crystals. But are these appropriate analogies? They are not for at least two reasons. (1) Snowflakes and salt crystals form highly ordered structures simply because of the emergent physical properties of matter when exposed to certain environmental conditions like temperature. The physical laws of matter allow for this. The DNA molecule, however, is incomparable because it not merely a simple repeating pattern that self-orders given the right conditions. The nucleotide bases (genetic letters that make up the DNA molecule) are sequence specific – they are not just random letters – and they do not form spontaneously. It is truly *prescriptive* information. And (2) self-ordering systems like snowflakes and salt crystals do not contain the essential attributes of Universal Information (UI), whereas biological information does. These essential attributes are described next.

4) Dr. Werner Gitt, former head of the German Federal Institute of Physics and a world-recognized expert in information theory has done extensive research in determining whether biological information is true information (and therefore a truly non-material entity). In the published proceedings of a symposium held at Cornell University in 2011, *Biological Information – New Perspectives*, Gitt shows that biological information encoded into the genome, fulfills the four distinguishing attributes that are necessary to unambiguously define ‘information’.⁵⁴ They are as follows:

51. Lester, L., and Bohlin, R., *The Natural Limits to Biological Change*, p. 157, 1989.

52. Bill Gates, *The Road Ahead*, Viking Pr, 1995.

53. Richard Lewontin, Billions and billions of demons (review of *The Demon-Haunted World: Science as a Candle in the Dark* by Carl Sagan, 1997), *The New York Review*, p. 31, 9 January 1997.

54. Gitt, W., R. Crompton, and J. Fernandez. 2013. Biological Information – What is it? In: Marks II R.J. et al., (eds)

a) Code plus syntax – symbolic representation and grammar: The decoded portion of DNA contains 4 letters (ATCG) that make up three-letter words (codon). These codons are arranged linearly in a various sequence (syntax).

b) Meaning – an informative message or specification: Each three-letter word (codon) represents 1 of the 20 specific amino acids required for life. The sequence (syntax) of the DNA word designates the specific sequence of the amino acids in protein synthesis.

c) Expected action – a command for the receiver to perform an action: Cellular proteins are biomachines that are essential for construction, function, maintenance, and reproduction of the entire organism.

d) Intended purpose – an expected result: Existence of life; a growing, metabolically active, reproducing organism.

Putting these four attributes into a formal definition, Universal Information (UI) is a symbolically encoded, abstractly represented message conveying the expected action and the intended purpose. In other words, biological information is exactly the same type of information that we use every day in our electronic communications. Biological information is just like real-world information that entails language, meaning, and purpose. It is what makes life alive in the same way information gives life to our computers, the Internet, and modern society. This is especially relevant in terms of origin of life theories. So often, researchers attempt to explain the origin of life on the basis of physiochemical processes alone. What they never seem to fully address is the far more difficult problem – the origin of information – *a non-material entity*. This is profound! A purely material entity cannot create a non-material entity. Gitt explains that Universal Information is always the product of will (intention). Put another way, information cannot originate by itself in matter apart from an intelligent sender. This has been repeatedly confirmed with countless real world examples. There are no known exceptions and should therefore be considered a legitimate scientific law. In describing the distinguishing attributes that define an intelligent sender, Gitt writes, “*An intelligent sender (in contrast to a machine) is self-conscious, has a will of its own, is creative, thinks autonomously and acts purposefully.*”⁵⁵ These are precisely the attributes of the personal Creator-God of the Bible. Could it be that DNA is the language of God used to specify the sophisticated biological systems and molecular nanomachines that make life possible?

Appendix 3 – A summary of some of the many additional problems with the Miller-Urey experiment that textbooks seldom mention.

- a) The Miller-Urey experiment failed to form even a single functional protein – the difficulty of which cannot be overstated. Amino acids do not generally spontaneously link together to form proteins (and if they do, they break down almost immediately). The average protein is made up of at least 100 amino acids and there are about 2,000 types of amino acids but only 20 are used for life. What makes a protein functional is the precise order of these 20 different amino acids linked together into what is known as a polypeptide chain. Typically, if

Biological Information – New Perspectives (pp 11-25). http://www.worldscientific.com/doi/pdf/10.1142/9789814508728_0001; A summary of Gitt’s findings shown above in attributes 1-4 are were obtained from <https://answersingenesis.org/genetics/information-theory/information-evidence-for-a-creator/>
55. Werner Gitt, in cooperation with Bob Compton, and Jorge Fernandez, *Without Excuse*, 2011.

even one amino acid is not in the right position the protein will not fold properly, and so will be biologically useless. With that in mind, what would be the odds of just one modest-sized functional protein (consisting of just 100 amino acids) forming by chance? Material scientist, Walter Bradley, and chemist, Charles Thaxton, have calculated the probability to be 4.9×10^{-191} – this is considered statistically impossible (exceeding 1×10^{-50}), no matter the amount of time available.^{56,57} It turns out that the spontaneous formation of a single functional protein (let alone the thousands that make up a single cell) is essentially impossible, even given eons of time, even if the oceans were *filled* with amino acids.

- b)** Amino acids can come in different conformations known as chirality. Like your hands, amino acids can be either left-handed or right-handed. However, it is interesting that life is made up of only left-handed amino acids. If a protein is made with just one amino acid that is right-handed it will destroy its function. The Miller-Urey experiment produced an equal mixture of left and right handed amino acids – which would be biologically lethal.
- c)** Miller and Urey assumed a reducing atmosphere (meaning no free oxygen) in their experiment. This was strategic, because they knew that oxygen would have ruined the experiment. They excluded oxygen only because they needed to – not because there was evidence that it was absent from the early earth atmosphere. Earth’s deepest sedimentary deposits contain large amounts of oxygen; suggesting the “early earth” atmosphere was always rich in oxygen.
- d)** Oxygen is a two-sided coin – it is destructive but also necessary. Oxygen makes up the ozone layer in the form of O₃, which protects polymers (biomolecules) from the sun’s harmful UV rays. If the early earth lacked oxygen, the sun’s intense ultraviolet radiation would rapidly destroy any newly forming molecules. This introduces a catch-22. With oxygen, life’s molecules are destroyed through the oxidation process but *without* oxygen UV radiation destroys them faster than they form. As Michael Denton notices, “*What we have is a sort of a “Catch 22” situation. If we have oxygen we have no organic compounds, but if we don’t have oxygen we have none either.*”⁵⁸
- e)** Although there is no agreed upon “standard model”, scientists now reject the starting chemicals and conditions that were used in the Miller-Urey experiment. They openly acknowledge this. For example, researchers in the journal *Science* note, “*the early earth atmosphere looked nothing like the Miller-Urey simulation.*”⁵⁹ Instead of an atmosphere consisting of water vapor, H₂, CH₄, and NH₃, researchers now assume it consisted mostly of N₂, CO₂, and some water vapor, but “*...so far, Miller-Urey-type experiments using such atmospheres have not produced organic molecules.*”⁶⁰
- f)** To ensure that the newly formed amino acids were preserved, Urey and Miller set up a trap or separation chamber. Once the amino acids were dissolved in the condensing chamber they conveniently dripped into the trap. Otherwise, the simulated “environment” (the glass

56. Thaxton, C., Bradley, W., and Olsen, R., *The Mystery of Life’s Origin*, p. 80, 1992.

57. “Events whose probabilities are extremely small never occur... . We may be led to set at 1 to the 50th power the value of negligible probabilities on the cosmic scale.” Emile Borel, *Probabilities and Life*, p. 28, 1962. For further information on probabilities of amino acid formation, see *War of World Views* book available at answersingenesis.org.

58. Denton, M., *Evolution: A Theory in Crisis*, Adler & Adler, Bethesda, MD, 1985, p. 261.

59. Cohen, J., *Novel Center Seeks to Add Sparks to Origins of Life*, *Science* 270:1925-26, 1995.

60. Campbell, Neil A., Reece, Jane B.; Taylor, Martha R.; Simon, Eric J., and Dickey, Jean L., *Biology Concepts and Connections*, Sixth Edition, p. 295, 2009.

flask mixture) would have quickly destroyed the newly formed molecules. On the primitive earth, no specialized preserving mechanism would have existed.

- g) The problem of hydrolysis cannot be avoided if life started in the oceans. Hydrolysis is the well-understood chemical process by which proteins (polypeptide chains) split apart into amino acids subunits through the addition of water molecules. Newly formed proteins would break apart faster than they could form. Scientists freely confess this is a serious problem for origin of life scenarios. For instance, Richard Morris, science writer and physicist writes in *The Origin of Life and Evolutionary Biochemistry*, “Furthermore, water tends to break chains of amino acids apart. If any proteins had formed in the oceans 3.5 billion years ago, they would have quickly disintegrated.”⁶¹

Appendix 4 – Problems with the so-called “pre-RNA world” which alleged gave rise to the RNA world.

Leading origin-of-life researcher, Dr. Gerald Joyce, has listed some of the many problems with the “pre-RNA world”⁶² – an imaginary world needed to establish the primary “RNA world” (also purely imaginary). It is important to note that the reason for invoking a “pre-RNA world” is because of what Joyce refers to as the “long and difficult road” to producing RNA from precursor molecules. Joyce confesses, “*The most reasonable interpretation is that life did not start with RNA.*”⁶³ To make what appears to be an impossible feat (the production of pre-biotic RNAs) possible, Joyce invokes “*a simpler genetic system, or systems, that preceded RNA and that evolutionary advances made by the ancestral system was somehow carried over to the RNA world.*”⁶⁴ In short, one imaginary world with insurmountable barriers was replaced by another imaginary world with its own insurmountable barriers. Here are some of the scientific problems with the “pre-RNA world” hypothesis:

- a) **Requires the right atmosphere:** Joyce explains, “*The composition of the prebiotic atmosphere is a problem of fundamental importance... a strongly reducing environment is most favorable for the synthesis of organic compounds.*”⁶⁵ In other words, unless you have just the right atmosphere, a pre-RNA world cannot exist. He writes, “*At present, the weight of evidence indicates that the prebiotic atmosphere was not strongly reducing*”⁶⁶ – and therefore counterproductive in terms of forming key pre-RNA molecules.
- b) **Requires key reactants to form RNA building blocks:** RNA building blocks (nucleosides) cannot form without precursor reacting molecules. Joyce explains the early earth atmosphere may have (though with great difficulty) been able to produce these – HCN and H₂CO. However, he mentions, “*Once produced, HCN would have been hydrolysed and H₂CO would have been destroyed by ultraviolet radiation, unless they happened to enter a relatively protected microenvironment and managed to combine into more stable compounds. But such combination cannot occur unless the reactants build up to sufficiently high concentrations, which they cannot do unless they are already protected from*

61. R. Morris, *The Big Questions* (New York: Times Books/Henry Holt, 2002). P. 167.

62. Joyce G.F., RNA evolution and the origins of life, *Nature* 338:217-224, 1989.

63. Ibid., Joyce G.F., 1989.

64. Ibid., Joyce G.F., 1989.

65. Ibid., Joyce G.F., 1989.

66. Ibid., Joyce G.F., 1989.

*decomposition.*⁶⁷ To rescue the situation, Joyce invokes additional *ad hoc* assumptions and improbable scenarios to ensure HCN and H₂CO can form in significant quantities without being degraded. What is required next is a cascade of chemical reactions including what Joyce refers to as “... a remarkable polymerization reaction.”⁶⁸ Put simply, a number of highly unlikely chemical reactions would have to take place to produce ribose (a five carbon sugar), which is necessary to form the building blocks of RNA. To this Joyce adds another exception writing, “From a prebiotic perspective, the formose reaction seems a good way to produce ribose and other sugars, although unless they were rapidly used to form nucleosides or some other useful compound, they would have been subject to degradation. It is a long and difficult road from HCN and H₂CO to the activated nucleoside phosphates that make up RNA.”⁶⁹

- c) Requires a cascade of chemical reactions:** The RNA molecular structure consists of ribose sugars which are attached to a phosphate group and one of two types of molecules – purines (adenine and guanine) or pyrimidines (cytosine and uracil). Purines and pyrimidines make up the nucleotide bases of the RNA molecule, so they are essential to the RNA world hypothesis. In the *Nature* article, Joyce explains that while HCN may produce purines in the prebiotic environment, “The prebiotic synthesis of pyrimidines, on the other hand, is more problematic and it is difficult to see how a supply of cytosine or cytosine containing molecules could have been maintained... it requires concentrations of reactants that are unlikely to have occurred on the primitive earth. ... Furthermore, cytosine would have undergone rapid hydrolysis to uracil.”⁷⁰ Adding another layer to this problem Joyce writes, “The greatest problem with the pyrimidines is not their synthesis but the difficulty of attaching them to ribose to form pyrimidine nucleosides. ... It is unclear how ribose could be singled out from the complex mixture of products. ... Even if such mechanisms were operating they would have resulted in a racemic mixture of D-and L-ribose which still leads to serious difficulties.”⁷¹ The paper goes on and on addressing a myriad of additional chemical obstacles – overcoming one obstacle only introduces you to another and so on and so on. This can be likened to a track star trying to jump over a thousand hurdles, each one a hundred feet high. As Joyce acknowledges, “You have to build straw man upon straw man to get to the point where RNA is a viable first biomolecule.”⁷² He concludes in his *Nature* paper confessing, “The transition to an RNA world, like the origins of life in general, is fraught with uncertainty and is plagued by a lack of relevant experimental data. Researchers into the origins of life have grown accustomed to the level of frustration in these problems.”⁷³

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67. Ibid., Joyce G.F., 1989.

68. Ibid., Joyce G.F., 1989.

69. Ibid., Joyce G.F., 1989.

70. Ibid., Joyce G.F., 1989.

71. Ibid., Joyce G.F., 1989.

72. Ibid., Joyce G.F., 1989.

73. Joyce G.F., RNA evolution and the origins of life, *Nature* 338:217-224, 1989.