Did the Origin of Life on Earth Require God's Help?

The evolution of all life on earth from a single primitive life form is straight forward and fairly easy to understand on the basis of Darwinian principles of mutation and natural selection. However, the question of where the first primitive life form came from is not so easy. Even such notable scientists as Sir Francis Crick, the discoverer along with James Watson of the structure of DNA stated, "we cannot decide whether the origin of life on Earth was an extremely unlikely event or almost a certainty." A number of scientists, including Crick, found the problem so difficult that they suggested an alien origin. This of course does not solve the problem. Just because life may have started first on another planet still does not answer the question - How did it get started? The question of the origin of life makes classic fodder for a God of the Gaps.

The reason this is such a complex subject is related to the age old question – Which came first the chicken or the egg? With the advent of modern molecular biology this question has morphed into – Which came first DNA (deoxyribonucleic acid) or protein? The problem is, DNA provides the coding for the amino acids to combine in the right sequence to make proteins, and proteins, specifically the enzyme DNA polymerase, is required to make DNA. Many scientists have addressed this seemingly unsolvable conundrum, mostly unsatisfactorily. Since RNA (ribonucleic acid) based life is likely to have occurred before DNA based life, the real problem is, which came first RNA or protein?

Dr. Christian de Duve, with two other scientists, was awarded the Nobel Prize in Medicine in 1974 for their discoveries concerning the structural and functional organization cells. These scientists used centrifugation in a rapidly spinning rotor to separate disrupted cells into component parts. Previous workers had separated cell parts into four fractions - nuclei, mitochondria, microsomes and soluble components. By careful analysis of the enzymes in different layers, De Duve and coworkers identified two new enzyme loaded particles – lysosomes and peroxisomes. They found that distinct sets of enzymes were present in each cell fraction. "The gap between biochemistry and morphology (structure) was finally bridged."

De Duve applied his expertise in cell structure to the problem of the origin of life and the RNA first or protein first problem. His proposal is outlined in two books Vital Dust, 1995 and *Life Evolving*, 2002. He cleverly proposed that neither came first – they both evolved together. He suggested this occurred in two stages or ages. The first was the Age of Chemistry. This involved the development of primordial ponds enriched in the simple organic compounds such as ammonia, ammonium cyanide, hydrogen sulfide, and methane, and the more complex amino acids (glycine, alanine, valine and others), and nucleotides (adenosine, cytosine, guanosine and uridine). Many different experiments have shown that the latter can be produced by ultraviolet light and lightening in the presence of methane, ammonia, hydrogen and water, all common in the atmosphere of the early earth. Conditions in comets are also suitable for the production of a range of organic compounds and millions of comets rained down on the early earth.

The second stage or age was the Age of Information. Here the random combinations of small numbers amino acids produced very short and very primitive enzymes that helped to combine short links of nucleotides into longer stretches of RNA and short RNA genes capable of coding for longer primitive enzymes and still longer stretches of RNA. Even a few percent increase in efficiency would have been sufficient to initiate selection for the best combinations and these and would lead to further improvements by further selection.

The beauty of this proposal is that it eliminates the thorny problem of which came first, RNA or protein – they evolved together. Apparently this process was very efficient since life began on earth very shortly after the earth had cooled enough to allow it. Since there are many billions of stars in the universe, even if only 1 in 10,000 had planets suitable for life, millions of such planets are out there. De Duve suggested that the mechanism he outlined was so efficient that there are millions of planets with life. He termed this Vital Dust. It is not surprising that a scientist expert in studying the metabolism of cell soup in the 20th century would be the person to propose how a metabolic soup more than 4 billion years ago could result in the origin of life. As with Darwinian evolution in general, a supernatural force was not required for life to get started.

About the Author

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