

17 May 2006

By: Vlad Tarko, Senior Editor, Sci-Tech News



[Life Did Not Appear with A Self-Replicating Molecule](#)

A new mechanism for the appearance of life is proposed

A scientist proposes an alternative theory to the "replicator" theories of the origin of life - the idea that a self-replicating molecule, such as RNA, has spontaneously appeared and then spread and diversified. Robert Shapiro from New York University calls such a possibility a "stupendously improbable accident", although chemists managed to create "prebiotic" syntheses in the lab - syntheses of various building blocks of life such as amino acids. Shapiro says that the use of modern apparatuses and purified reagents is very unlikely to mimic the actual conditions on early Earth. He says that one of the problems of replicator theories is that a high diversity of molecules of all sorts seems to hamper and endanger the replicator. The mere complexity of the assumed original replicator makes it to be unstable. He argues that what probably happened was the exact opposite - chemical variety was probably beneficial and increased the probability of life. The issue is how this chemical diversity eventually turned into self-replicating chemicals - i.e. life. He proposed the idea that life began within a mixture of simple rather than complex organic molecules, multiplied through catalyzed reaction cycles and an external source of available energy. In other words, in the beginning it wasn't a molecule that replicated *itself*, there were a bunch of molecules that replicated *each other*. Life didn't start, according to this theory, with 'I replicate myself', it started with 'I replicate you and you replicate me'. "The diversity of organic chemistry, with its harvest of competing, interconnected reactions, becomes an asset rather than a liability in the case of the energy-driven system," explains Shapiro. "The existence of side reaction paths can provide the network with the capacity of reacting to circumstances." The appearance of a molecule that can self-replicate was not the first step, because this requires the combination of diverse chemicals in a long sequence of reactions in a specific order. This specific order appeared gradually. What drove this increase in complexity was the external source of energy - probably the Sun or maybe Earth's internal heat. This is thus a thermodynamic theory of the origin of life, rather than simply a chemical one; it better incorporates into the theory the vital role played by the external energy source. "If we wish a more plausible origin of life, then we must work with the assumption that life began, somehow, among one of the mixtures of simple organic molecules that are produced by abiotic processes," writes Shapiro. "Nature will be instructing us, rather than we attempting to impose our schemes onto it."