Chicken Soup, Self-Organization and the Origin of Life: A Test

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Explaining the origin of life is one of the enduring problems for a naturalistic view of nature. Several conjectures have been offered to explain how life might have originated without an intelligent designer.

One of the most prominent conjectures of the origin of life has been the familiar "primordial soup" hypothesis, in which it is postulated that simple organic molecules might form in the atmosphere and accumulate in the ocean, where they would react to form living systems. This idea is currently out of favor, for a variety of reasons. First, the scenario requires incompatible chemical conditions for the various constituents necessary for life. Second, there is reason to believe that the Archaean atmosphere contained sufficient atmospheric oxygen to destroy most organic molecules in the atmosphere before they reached the ocean. Third, there is no evidence of such an organic-rich chemical soup in Archaean rocks. Fourth, the "primordial soup" hypothesis relies too heavily on random molecular collisions, which are highly improbable in an ocean.

The insufficiency of chance molecular collisions led theorists to propose that certain surfaces might act to concentrate organic molecules where chemical interaction would be more highly probable. Clay surfaces have been suggested, but pyrite is more commonly proposed as the type of surface needed. The conjecture of life arising from chemical reactions on a surface has been whimsically termed the "primordial pizza" hypothesis. A variety of scenarios can be included under this theme, including so called "hypercycles," "surface metabolism," and "RNA world." All these scenarios seem to assume some kind of self-organizational property of the materials that compose a living cell. Self-organization means that if the chemicals needed for life are all present in a small space, under the appropriate physical and chemical conditions, they will spontaneously assemble themselves into a living cell.

The notion of self-assembly of molecules into cellular components is currently a subject of scientific scrutiny. Do the chemical properties of molecules tend to drive chemical reactions in such a way that life results? One prominent origin-of-life theorist affirms that, under the proper conditions, the spontaneous formation of a living cell is "inevitable."[1] A similar claim is imposed in the notion of a "fully gifted creation."[2] According to this proposal, God "fully gifted" the creation in the beginning so that no further divine input is necessary. This implies that, under the appropriate conditions, without any activity by an intelligent agent, organic molecules will form and spontaneously self-assemble to produce life. Can such an idea be tested experimentally?

Chicken soup might provide such a test. Chicken soup is widely available in sealed containers, where undesirable oxygen and other chemical contaminants are excluded. Each tin of chicken soup contains a concentrated mixture of the organic molecules needed for life. Thus, the conditions postulated for the origin of life are present in each tin of chicken soup. If these molecules were actually "fully gifted" with chemical properties that drive their reactions toward producing life, or if the production of life is "inevitable" under such circumstances, one would surely expect to find some form of life in a least some tins of chicken soup. If a vertebrate source proves unsatisfactory, perhaps one could experiment with an invertebrate source such as clam chowder or some other material. Pyrite or other material could be included to provide a potential surface for facilitating chemical reactions. Perhaps different temperature regimes could be used. Regardless of the details, it seems possible to test the idea that molecules possess sufficient properties of self-assembly so that life can arise spontaneously.

A note of caution may be in order, however. If molecules actually possessed such properties, would we expect to observe death from "natural causes?" If molecules naturally tend to self-organize into living systems,

what circumstances could cause them to lose this chemical property and permit death? What would happen if an organism were to die, say from physical trauma? At the very least, one would expect the constituents of the dead organism to spontaneously re-assemble themselves into some form of simple life. I am not suggesting that a dead elephant should re-assemble into a living elephant, but rather that at least some of the molecules of a dead elephant should re-assemble into some "simple" form of life such as a bacterium or protozoan. This might happen many times, or perhaps only in the anoxic environment of the deep tissues. The fact that we do not see such results strongly suggests that molecules do not possess the postulated properties required for self-assembly of a living cell.

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[1]C. DeDuve, "The Beginnings of Life on Earth," *American Scientist* 83 (1995):428-437.

[2]H. J. Van Till, "The Fully Gifted Creation," in *Three Views on Creation and Evolution*, edited by J. P. Moreland and J. M. Reynolds (Grand Rapids: Zondervan, 1999), 161-218.

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