

## Ilya Prigogine and Self-Organizing Systems: Prigogine's Fatal Flaw

By Timothy R. Stout

**Missouri State University.** Last October the Baptist Student Union at the University of Missouri at Springfield invited me to speak on campus. My primary topic concerned how it was impossible for one enzyme to evolve into a different one, doing so by changing one amino acid at a time in a succession of generations. The ramifications of this would be severe, presenting a fatal blow to evolutionary theory. The logic of the presentation was fairly simple: An enzyme is formed out of a single string of amino acids, with various portions of the string grouping into a predetermined arrangement of coils and sheets. The shape produced by a specific arrangement of coils and sheets determines an enzyme's behavior. However, in order to change one enzyme into another, there would need to be a mechanism to change coils into sheets and vice-versa, one amino acid at a time. Furthermore, there would need to be a selection advantage driving each step of the transformation. This goes against what we know and understand of enzyme behavior. Rather, after a few critical amino acids had been modified, an enzyme would typically fall apart (denature). Natural selection selects away from such changes. Therefore, natural selection will select away from essential steps in a transformation and one enzyme cannot evolve into another. The entire scheme of large-scale, macroevolution falls apart with this observation. This was the main focus of the presentation.

**Self-Organization In Nature.** During the presentation, several graduate students in biology who were in the audience made some comments about how science has shown that nature organizes itself and that evolution is a natural consequence of self-organization. I did not have opportunity to respond to their comments, not wanting to be diverted from the topic at hand. I did believe, though, that the issues of entropy and the second law of thermodynamics as applied to information theory clearly taught against self-organization, as any physics student would know. I attributed their comments to being biology majors and not physics majors.

**Question From A Biochemistry Professor.** Then, a few months ago I got an e-mail from a biochemistry professor who teaches at UCLA. He had come across one of our DVDs. He asked a question about what I thought about open thermodynamic systems, particularly as discussed by Ilya Prigogine. I was unfamiliar with Prigogine, but did recount to the professor my argument on the impossibility of enzyme transformation such as I presented at MSU. He did not respond to the enzyme comments, just saying that open thermodynamic systems were the topic.

**Ilya Prigogine, Nobel Prize Winner.** So, I decided to see whom Prigogine was and what he had to say. It turns out that Ilya Prigogine received the Nobel Prize For Chemistry in 1978. He received the Prize because of theoretical work he had done on the behavior of systems far from thermodynamic equilibrium. For those of you who are familiar with chaos theory, Prigogine's observations are a key component of our understanding of chaotic behavior. I purchased Prigogine's book, *The End of Certainty* and read it.

**A Squall Line Represents Self-Organization.** Prigogine explained how nature organizes itself spontaneously in systems far from equilibrium. As an illustrative example of self-

organization, though mine and not his, consider a cold, dry air mass flowing over a warm, moist air mass. The weather is relatively calm within each of the masses. However, at the boundary between the two masses, chaos in the form of a squall line develops. Regular patterns of thunderheads, with all of their associated internal structure appear. Even tornadoes can form. The squall line represents an extremely organized portion of the atmosphere. Yet, neither of the colliding air masses which produced the squall line demonstrated initial organization resembling anything like the squall line. So, from where did this organization come?

**Self-Organization Is Caused By Resonance.** Prigogine points out that if you have an ensemble (a large collection) of particles and if these particles are not at equilibrium, interactions between the particles as they attempt to go to equilibrium will produce a form of resonance. A simple example of resonance would be the sound made when one blows across a soda pop bottle or plays a flute. Resonance expresses itself in waves and waves represent organization. Thus, when one blows across the bottle, the air in the bottle spontaneously organizes resonant waveforms and produces a sound. This is fine. We can see examples of resonant behavior all around us. A pop-bottle resonance is not as complicated as the organization exhibited in a squall line, but the two are related. Furthermore, Prigogine's claim that a form of self-organization takes place in a resonant system appears reasonable and observable.

**Limits To Self-Organization.** Notice, though, that there are limits to the degree of self-organization that resonant behavior is capable of producing. For instance, no matter how much skill a person might display when blowing on a flute, a single flute will never sound like a symphony orchestra. No matter how many different shapes of clouds a thunderstorm might produce, there is no reasonable expectation of seeing a group of clouds which look like the words on a page and form a full sentence having any kind of coherent information. It is important to recognize that self-organization has extremely stringent limits as confirmed by reason and observation. Also, in real life, examples of self-organization last briefly and then disappear. This is true of oscillating chemical reactions. It is true of thunderstorms.

**Prigogine Goes Too Far.** Prigogine goes too far. He does not recognize limits to self-organization. By contrast, having established that a degree of self-organization takes place in systems far from equilibrium, he extrapolates beyond reason. For instance, on page 128 he says, "We now begin to understand the dynamical roots of organization, the dynamics at the root of complexity that are essential for self-organization and the emergence of life." As effortlessly as walking across a room he moves from the complexity of a thunderstorm to the complexity of a living cell, complete with its huge body of stored information and its elaborate system used to decode and use the information. However, even that is not enough, he goes even further. On page 162, he says, "Irreversibility...starts at the dynamical level. It is amplified at the macroscopic level, then at the level of life, and finally at the level of human activity." On page 70 he talks about how "these concepts are now applied to a wide group of problems in biology, sociology, and economic..." Then, on page 71 he summarizes, "We see that human creativity and innovation can be understood as the amplification of laws of nature already present in physics or chemistry."

So, Prigogine asserts that self-organization due to resonance in systems out of equilibrium not only can produce life, but is the source of organization of human society and of economics. It is also the underlying root of human creativity and innovation.

There is an almost infinite gap between the organization exhibited by a squall line and that exhibited by human society, including the all the levels of complexity of a group of people making up a society. Obviously, the question becomes whether or not self-organization can reasonably be extended to this level.

**The Necessity Of Understanding Limits.** Prigogine makes a very interesting comment on page 29 of his book. Most scientists were at first very reluctant to accept Prigogine's work on what are now recognized as chaotic systems. In Prigogine's mind, they were making unreasonable extrapolations from what they understood to what he was talking about. In response to what he considered unreasonable resistance to his ideas, Prigogine stated, quoting a friend of his, "No physical concept is sufficiently defined without the knowledge of its domain of validity." In other words, you do not really understand a concept until you understand the limits for which it is valid.

So, using Prigogine's own standard that he readily applies to others, we do not really understand self-organization until we understand its limits.

Prigogine extends his observed, limited examples of self-organization to the origin of life, to human creativity and to the manner in which society itself is organized and functions. The question becomes, then, is this a valid extension, based on observation, or is it idle speculation pontifically pronounced against reason?

**Prigogine Acknowledges Limited Amount Of Evidence.** First of all, Prigogine acknowledges on page 71, "There is still a gap between the most complex structures we can produce in nonequilibrium situations in chemistry and the complexity we find in biology." In other words, he jumps the gap beyond the level of complexity such as seen in a thunderstorm or its equivalent in a chemical reaction and the level of complexity such as seen in a living cell without proof. Notice, we quoted him earlier (page 162) talking about how irreversibility, and in context, the self-organization associated with it, starts at the dynamical level, is amplified to the macroscopic level, then to the level of life, and finally to the level of human activity. This is a huge extrapolation from the degrees of self-organization we have observed. What evidence does he have for this extrapolation? Well, on that page his next sentence continues, "What drove these transitions from one level to the next remains largely unknown." In other words, he has no proof at all. He is uttering philosophical gibberish as certainties in the name of science.

**The Unreasonableness Of Prigogine's Extrapolations.** So, if Prigogine's extrapolations are without observed basis, are they even reasonable? No, they are not. Living systems are information-driven systems. A huge body of information defining every aspect of how a living cell is built and how it operates is defined in its genetic code. An extremely complicated decoding mechanism is required to use the information stored. Yet, there is an irreducible complexity inherent in an information-driven system. Both the information and the

information decoder need to show up simultaneously. Furthermore, as we mentioned in the introductory paragraph to this article, it is not even reasonable to expect that one enzyme can be transformed into another, making evolution impossible. So, the things we have learned and observed from science indicate that the entire living cell needs to be formed in a single step.

**Prigogine's Fatal Flaw:** I wrote the UCLA biochemistry professor a final e-mail. The subject heading was, “Prigogine’s Fatal Flaw In Five Words.” What are those five words? “Resonance Does Not Generate Information.” The simultaneous appearance of an extensive body of information along with all of the components to properly make use of the information is a single-step process. It does not develop slowly and gradually on a step by step basis.

**A fatal misunderstanding.** On page 66 of his book, Prigogine states, “It is interesting to note that these conditions are satisfied in all living systems: Nucleotides code for proteins, which in turn code for nucleotides.” This statement is Prigogine's rationale for extending self-organization to biological systems. The problem is that it is not true. Proteins do not code for nucleotides. Altering a protein structure does not produce a corresponding modification to nucleotides structure. The central dogma of biology is that DNA codes for RNA codes for protein. There is a one-way street between nucleotide organization and protein organization. In fact, this problem is so serious that many scientists have proposed what is called an RNA world as a step in a naturalistic origin of life, since an RNA world would not have protein in it and would not need to deal with this problem. If the coding between nucleotides and protein is one way, then there is no resonance. If there is no resonance, then there is no self-organization. Prigogine overlooked one of the most fundamental principles of biochemistry. As a result, his conclusions are false. His misunderstanding of the relationship between nucleotides and protein is fatal to his conclusion that his discoveries provide a basis for living systems to self-organize.

**An Effectively Unbridgeable Gap.** There is an effectively unbridgeable gap between the complexity of an information-driven living cell and that exhibited in a squall line. The gap represents information and all that is associated with it.

**The Pest.** So, the professor initiated the conversation, asking what I thought about Prigogine. I indicated that evolution was impossible because of the above-mentioned problems of changing one enzyme into another. I then said that Prigogine went too far, because living systems are information driven and resonance does not generate information. What was his rebuttal to my comments? It was classic: “Go away and stop pestering me.” After getting over my initial shock, I had to laugh, though in sadness at the hardness of his heart. He asked me the questions. When I gave him answers that he could not rebut, I became a pest.

**Expelled.** If you have seen the recent movie, “Expelled,” you can identify with what I just experienced myself personally.

**Darwin: Imaginary Evidence Overrides Observed Evidence.** Prigogine sort of follows a pattern started by Darwin in Origin of Species and copied by evolutionists ever since. Darwin offered a reasonable explanation of a very small realm of observed behavior, slight changes in the shape of bird beaks. He then extrapolated what he observed and applied it to large scale,

macro evolutionary concepts—a worm becomes a man . Frequently, this extrapolation contradicted actual observations, such as limits to variability observed by animal and plant breeders, or systematic gaps in the fossil record. However, at least Darwin discussed the limitations and offered imaginary explanations for why the observed data contradicted his theory. In effect, Darwin placed imaginary evidence ahead of observed evidence. The theory of evolution is the only theory of science which has been widely accepted on the basis of imaginary evidence in the face of contradictory observed evidence.

**Prigogine Dogmatic Without Evidence.** Prigogine now comes along and proposes a means of self-organization supposedly adequate to explain a natural origin of a living cell, indeed even of human creative power. His evidence: simple levels of organization of chemicals observed in a laboratory. I have also presented a squall line as an equivalent example of observed complexity. However, there is a huge gap between the complexity of a squall line and the complexity of a living cell or that is exhibited by a group of human beings functioning in a society. Cells are information driven and resonance does not generate information. Hence, Prigogine's extrapolation goes against what we understand to be reasonable based on observed data. However, Prigogine only sort of follows Darwin's pattern. Whereas Darwin at least discussed problems with his theory, Prigogine merely states that we have not observed such complex behavior in operation. He then proceeds to act as if all of his extrapolations were proven, anyway.

**The Reality: Entropy Still A Roadblock Against Macro Evolution.** It is sad to see students such as those graduate students in biology at Missouri State University falling for Prigogine's unfounded extrapolations. Resonance does not generate information. There are limits to the amount of self-organization capable of being produced in a resonant system. Yet, information lies outside of these limits. Thus, Prigogine's concept of self-organization is not even remotely close to accounting for the organization exhibited in an information-driven, living cell. Evolutionists are still faced with the reality that they have no answer to the problem entropy presents to their system of thought.

**God Is The True Source Of Man's Creative Power.** In reality, man's creative power comes from God. The Bible declares that there is a living God who created the universe out of His power and wisdom. Furthermore, He created man: "Then God said, 'Let Us make man in Our image, according to Our likeness; let them have dominion over the fish of the sea, over the birds of the air, and over the cattle, over all the earth and over every creeping thing that creeps on the earth.' So God created man in His own image; in the image of God He created him; male and female He created them (Genesis 1:26-27)." Man's creativity is the result of God's deliberate creative effort. It is not the result of a statistical fluctuation in a chemical reaction out of equilibrium.

Indeed, life itself is a result of God's creative work. It begin with the creation of plant life: "Then God said, 'Let the earth bring forth grass, the herb that yields seed, and the fruit tree that yields fruit according to its kind, whose seed is in itself, on the earth'; and it was so. And the earth brought forth grass, the herb that yields seed according to its kind, and the tree that yields fruit, whose seed is in itself according to its kind. And God saw that it was good

(Genesis 1:11-12).” It continued with the creation of animal life, as seen in the subsequent verses. It culminated in the creation of man, as we just read.

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