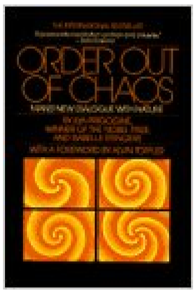
# Order Out Of Chaos



## Synopsis

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## Book Information

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## Customer Reviews

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This is the most important book I have read. As a scientist/engineer for the past 50 years, I have read extensively and, since I consider myself a student of reality with an openness to religious interpretations, I find Prigogine’s final two books outstanding. His first book, From Being to Becoming was short as explanation of reality that is viewed as "being" but best understood as "becoming". However, Order Out of Chaos and his final book, The End of Certainty, are must reads for anyone wishing to challenge the small minded atheists who purport to be scientists.

This book was written to address the fatal flaw in the theory of evolutionÃ¢Â Â”the law of entropy, accepted as one of the fundamental laws of the universe. Evolution says that life proceeds from simple to complex, while entropy says just the opposite. Both cannot be true. Most evolutionists choose to ignore it. Prigogine, although he is an evolutionist, chooses to face it. He says ( page 5)

Ã¢Â Âœwe can only proceed by guessworkÃ¢Â Â• ( p14) Ã¢Â Âœ... Of course, the problem of the origin of life remains a difficult one, and we do not think a simple solution is imminentÃ¢Â Â|. The first two parts of this book thus deal with two conflicting views of the physical universe: the static view of classical dynamics, and the evolutionary view associated with entropy.Ã¢Â Â• (p15) Ã¢Â ÂœA confrontation between these views has become unavoidableÃ¢Â Â|. We can no longer avoid this confrontationÃ¢Â Â• However, at the conclusion, he says (p301) Ã¢Â Â| As we have written at the start of this chapter, our feeling of intellectual security has been shattered. (p311)Ã¢Â Â| we cannot describe for you the world as we would like to see it, but only as we are able to see itÃ¢Â Â|

The book is not an easy read. I found it quite disorganized (chaotic, if you will), and only by going through it a second time--indexing all the text that I highlighted--did I find order emerging. I wonder if some important nuances were lost in the translation into English. The book was helpful however in understanding the themata that has determined the form scientific development has taken: From Newtonian dynamics as the universal, deterministic fundamental level of description to equilibrium thermodynamics with the arrow of time toward heat death, to Relativistic physics with the important role of the observer, to quantum mechanics with randomness and indeterminacy, to non-equilibrium thermodynamics with irreversibility and dissipative structures as the crucible of creation of order from chaos. The book counters the New Age trend to ground human existence in quantum physics. Biology, let alone consciousness, though it is consistent with microphysics,can not be deduced from it. It’s scale alone takes it out of the planck domain. The objects of study of physics are simple compared to the complexity of living systems. Even chemistry, characterized by irreversible process, is not reducible to physics:(pg. 136-137). Biochemistry with auto-catalytic and cross-catalytic processes creates far-from-equilibrium steady states that by virtue of being unstable, are therfore sensitive to the boundary conditions in which they exist, and therefore confer adaptability to changing environmental conditions. Crash goes the reductionistic freight train! Complexity theory is the foundational science of biology, and should be for medicine if it is to be redeemed from it’s current abandonment of healing for pharmacologic symptom suppression.

The authors examine the history and intellectual underpinnings of our understanding of the universe in terms of thermodynamics and non-equibrium systems. It is interesting to consider the questions involving heat that came to the attention of the scientific community in the 19th century world as it stood on the threshold of the industrial revolution. The world that would need to come to grips with the driving force of that revolution, the steam engine, was one where a staunchly deterministic worldview held sway--one initiated by Newton and Leibniz and championed by Laplace (p.78). The technological avatar of the deterministic 18th century world was the mechanical clock. Leibniz even imagined that every material point in this world was driven by its own internal clock such that all mechanical actions were illusions facilitated by perfect synchronization (pp.74,302).Perhaps the (unintentional) origin of the 19th century revolt against determinism was found in the writings of young Sadi Carnot, who in 1824 developed what proved to be an enduring model for the heat engines powering the industrial revolution (p.111). Interestingly, young Sadi’s thoughts were influenced by the ideas of his famous academic father Lazare Carnot, who thought that mechanical systems would be most easily modeled when abrupt changes in motion were avoided; hence the quasi-static and constant-temperature aspects of Sadi Carnot’s model. Carnot’s model, though initially too obscure to glean any notice at all, eventually became extremely influential. By 1850 Clausius had reformulated Carnot’s model in terms of conservation of energy (p.114). In 1865 Clausius used Carnot’s theory as the basis of the concept of entropy (p.117).In 1872, Boltzmann published a paper that articulated a different version of entropy--one that saw the tendency for entropy to become larger as a given system evolved into more probable configurations (p.240). In fact, Boltzmann’s view that such systems must evolve over time was due in part to his admiration for the concept of biological evolution as articulated by Charles Darwin (p.240). As reasonable as Boltzmann’s version of entropy seemed, however, it was considered incomplete by such luminaries as Poincare (p.243) and Zermelo (244). Because Boltzmann’s theory did not address Poicare’s concern that every closed dynamical system reverts in time to its previous state, Boltzmann’s version of entropy could not be taken completely seriously (p.253). I wonder, however, if it did not occur to Poincare and others that the time required for such a system to revert to its previous state would vastly exceed the age of the universe--which would seem to be an important consideration!Eventually, in the mid-to-late 20th century, Prigogine and his colleagues were able to address the shortcomings of statistical thermodynamics. This development, however, is not really clearly stated in this book--probably because this book is meant for laymen--who could not be expected to understand the mathematically-intensive quantum mechanical approach favored by Prigogine. In order to learn about Prigogine’s take on statistical thermodynamics, the reader should look into Prigogine’s book "Is future given" and the references therein.

A little bit older copy than what I expected. It’s clean and intact but could have been a newer one.

At times very difficult and challenging book. There are patterns and references to physics and physical chemistry, which usually repel humanists. But do not be afraid. Even if you do not understand everything, the book will sharpen your appetite for knowledge. A must read for anyone seriously interested in science and forecasting.



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