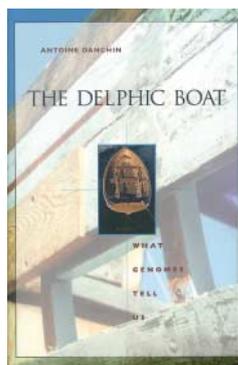


Algorithmic life

Suresh I.S. Rattan

The Delphic Boat: What Genomes Tell Us
by Antoine Danchin
translated by Alison Quayle
Harvard University Press, Cambridge,
Massachusetts, USA
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I approached this book with apprehension: first, about its translation from the original published in French in 1998, and second, about its potential lack of timeliness. Soon, however, I realized not only that my fears were totally unfounded, but also that the author and the translator had together almost recreated this work of tremendous topical and intellectual importance.

The book's central motif is the Greek mythological tale of the oracle at Delphi, who once asked a visitor: "If, in time, all the planks on a boat had been replaced, would it still be the same boat?" To the boat's owner who had witnessed its evolution, the answer would be "yes". The boat is not merely the sum of its components, but also something else, much more interesting: it is the relationships between the planks. In *The Delphic Boat*, Antoine Danchin elegantly applies the same principle to living organisms and argues that it is the relationships between the individual components of a cell that define life, rather than the components themselves.

Danchin, a professor at the Institut Curie in Paris, France, is a highly respected molecular biologist, admired and often

envied for his ability to transcend the reductive limits of his discipline. He has the rare combination of being able to combine both the rigours of molecular technology and the flights of philosophical argument, a feat that can also be termed 'liberation through intensification'. If Danchin sometimes seems to be taking liberties with his thought extrapolations, he has earned the right to do so by first rooting himself deeply, and proving his abilities in, the theoretical and experimental aspects of physics, mathematics and molecular biology.

The theme around which Danchin develops his book is that of life being fully compatible with the laws of physics and chemistry, but not being simply reducible to them. Conversely, he also rejects the 'wishy-washy' notion of the emergent characteristics of life that are promoted by self-proclaimed 'holists', which implies some sort of vitalism. Instead, he bases his arguments on the concept of the interrelationships among various levels of biological organization from atomic and molecular to cellular and beyond. The four basic processes of life—metabolism, compartmentalization, memory and manipulation—are the algorithmic expansion of the genome, which has no *a priori* meaning and purpose. In his view, life is an algorithm, which, with its ability to produce and reproduce relationships, is intrinsically creative.

The above conclusions detailed in this remarkable book are not based on some fuzzy and incoherent speculative thinking on the part of Danchin. Instead, more than half the book is devoted to explaining the fundamentals of molecular and cellular biology, including the genome, the proteome, the basic biochemical processes that are required for the survival and stability of the cell, and their interrelationships in creating a living system. The concepts of information, creation,

disorder, entropy and degradation, which are often misunderstood or misrepresented, are analysed and discussed from various angles, including philosophy, physics, chemistry and, in particular, in the context of darwinian evolution. Danchin is also fastidious about the relationship between structure and function, which, in his view, is often misconstrued. He strongly advocates the reversal of the current trend of studying the structures of macromolecules to identify their function, to the "...study of structures only when they are firmly linked with a function..."

Reading *The Delphic Boat* was a greatly inspiring experience for me. It made me reassess life as both a phenomenon and a process of algorithmic exploration, but one that is based on real structures and molecules. But why, then, does this algorithm progressively fail to maintain life, with the inevitable onset of ageing followed by death? I am surprised that Danchin did not have a single word to say about it!

Finally, in the 'Epilogue' he briefly touches on the issues of human morality and ethics, and almost seems on the verge of losing all hope and becoming engulfed by self-doubt. He writes, "...now that the written word has lost the almost sacred status it had for so long, I wonder about its significance. Should I have written it? Or indeed, what place is there for scientific writing? This is a minor work; what benefit can it bring?" But he recovers just in time and hands over his thread of intellectual discourse to future generations. The oracle at Delphi points towards such a continuity. This is a book to be read and pondered over.

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