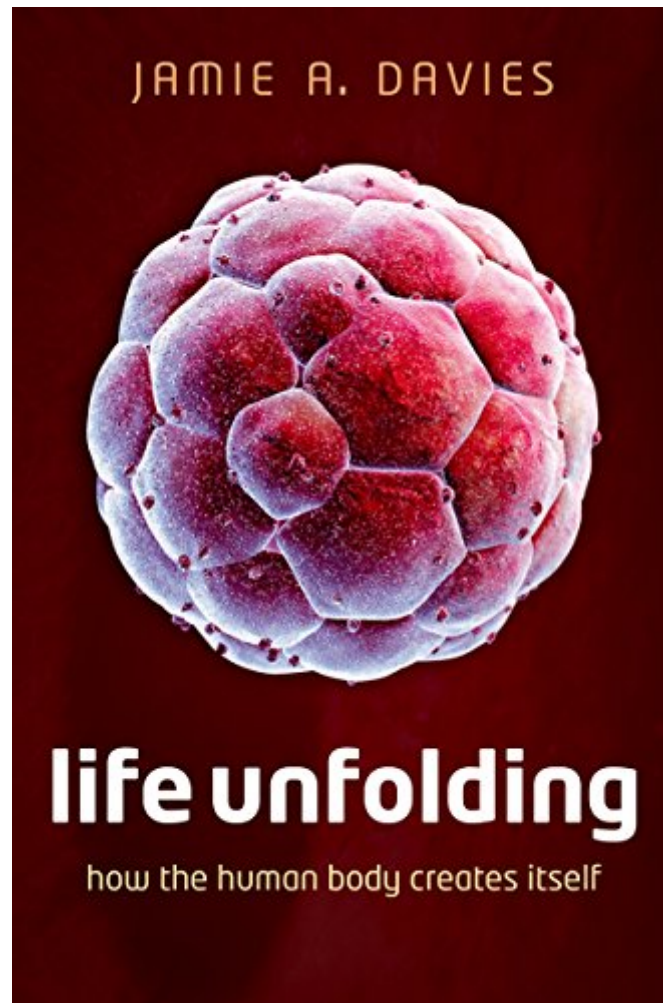


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# Life Unfolding: How The Human Body Creates Itself



## Synopsis

Where did I come from? Why do I have two arms but just one head? How is my left leg the same size as my right one? Why are the fingerprints of identical twins not identical? How did my brain learn to learn? Why must I die? Questions like these remain biology's deepest and most ancient challenges. They force us to confront a fundamental biological problem: how can something as large and complex as a human body organize itself from the simplicity of a fertilized egg? A convergence of ideas from embryology, genetics, physics, networks, and control theory has begun to provide real answers. Based on the central principle of 'adaptive self-organization', it explains how the interactions of many cells, and of the tiny molecular machines that run them, can organize tissue structures vastly larger than themselves, correcting errors as they go along and creating new layers of complexity where there were none before. Life Unfolding tells the story of human development from egg to adult, from this perspective, showing how our whole understanding of how we come to be has been transformed in recent years. Highlighting how embryological knowledge is being used to understand why bodies age and fail, Jamie A. Davies explores the profound and fascinating impacts of our newfound knowledge.

## Book Information

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## Customer Reviews

"The history of a man for the first nine months preceding his birth would probably be far more interesting than all the three score and ten years that follow it" - Samuel Taylor Coolidge. The book starts with this quote which is an excellent preamble to the contents. How a fertilized egg can transform itself through cell division into a human body with all its cell diversity is, for the vast majority of us, mind blowing. Life unfolding starts with the embryo and discusses aspects of what we know about how life develops. It can be hard to follow at times as the names of proteins and tissue regions are not easily memorized but the contents are fascinating. Life unfolding takes us through aspects of biological development looking at areas involved in conception all the way up until death. The topics are chosen to give us a sense of what people are focused on as well as how biological science is done. The book is split into 3 core parts. The first is titled First Sketch. The author starts at the beginning and looks at the journey of a fertilized egg. It discusses the potential mechanical mechanisms that a cell employs to divide effectively. The author communicated the initial conditions well so that the complexity of processes like cell division become more understandable to us. By this I mean people don't usually think about why cell division in and of itself should be difficult once the nucleus has divided but by describing the blindness of molecules to the geometry of the cell, the process of self organization is quickly realized to be highly non-trivial. The author discusses how the embryo moves to attach itself to the mother, how it uses mechanical principles to orient itself and start to create structure from symmetry.

Human life is not a miracle. A system that of such complexity that we don't yet understand it does not mean that system is miraculous. It's just really complex. We live in a time where we are starting to understand complex systems. We have the computing tools, the intellectual frameworks (from information and complexity sciences), and in this case the biological tools to start making sense of these intricate systems we can't understand fully. "Life Unfolding" presents a communications-centered view of human development. This doesn't mean it supplants genetic explanations - in fact they are two sides of the same ideas - but it does mean that many of the explanations here center on how proteins, cells and organs communicate enough information to create a human body without a grand plan. The picture of the developing human here is one of emergent behavior and complex and intricate information flows. The vocabulary here includes "signalling" and "gradients" and "feedback loops." Because of the constraints of evolution (far easier to add on to an existing process than change it), and development (stuff has to work all the while it's being created and changing form), the form that these take can sometimes be bafflingly and - at

least at first blush - needlessly intricate. However, because of this, the ability of this system to develop, function and repair in the face of varying environmental conditions, mutations, and errors far exceeds what humans have been able to thus far create.

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