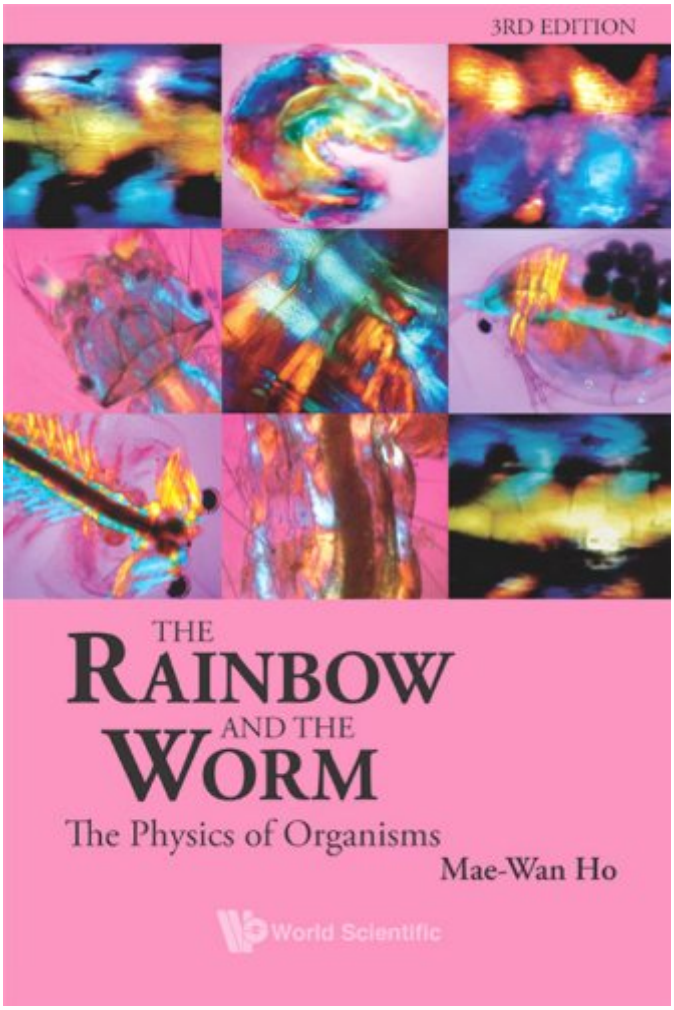
The Rainbow And The Worm:The Physics Of Organisms



Synopsis

This highly unusual book began as a serious inquiry into SchrÃ¶dinger's question, â œWhat is life?â •, and as a celebration of life itself. It takes the reader on a voyage of discovery through many areas of contemporary physics, from non-equilibrium thermodynamics and quantum optics to liquid crystals and fractals, all necessary for illuminating the problem of life. In the process, the reader is treated to a rare and exquisite view of the organism, gaining novel insights not only into the physics, but also into â œthe poetry and meaning of being alive.â •This much-enlarged third edition includes new findings on the central role of biological water in organizing living processes; it also completes the author's novel theory of the organism and its applications in ecology, physiology and brain science.Contents:What Is It to Be Alive?Do Organisms Contravene the Second Law?Can the Second Law Cope with Organized Complexity?Energy Flow and Living CyclesHow to Catch a Falling ElectronTowards a Thermodynamics of Organised ComplexitySustainable Systems as OrganismsThe Seventy-Three Octaves of Nature's MusicCoherent Excitations of the Body ElectricThe Solid-State Cell'Life is a Little Electric Current'How Coherent Is the Organism? The Heartbeat of HealthHow Coherent Is the Organism? Sensitivity to Weak Electromagnetic FieldsLife is All the Colors of the Rainbow in a WormThe Liquid Crystalline OrganismCrystal ConsciousnessLiquid Crystalline WaterQuantum Entanglement and CoherenceIgnorance of the External ObserverTime and FreewillReadership: Sixth-form and undergraduate students in physics and biology; biophysics, biochemistry and quantum mechanics undergraduates.

Book Information

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Customer Reviews

This book is not for the faint hearted! It requires an undergraduate level of thermodynamics, and some working knowledge of biology, and laws of relativity and quantum physics. The author has done her best to write this book to a general reader about physics and biology of life; a monotonous and tedious job to describe in a book of 250 pages. She is influenced by the work of celebrated physicist Erwin Schrodinger and his passion for understanding life. The reader can see Schrodinger's influence throughout this book. Chapter 2 to 6 deals with SchrÃ¶dinger's concept in explaining how a living cell exports entropy in order to maintain its own entropy at a low level or near zero there by circumventing the constraints of Second law of thermodynamics.In the second half of the book the author explores various physical and chemical concepts to show how nature keeps cellular entropy production to a minimum. First, the author discusses how the energy transductions in living cells occur, and she determines that heat transfer is not the major form of energy transduction. The biomacromolecules are setup within the cell to near solid state or liquid crystalline like state such that it promotes synchronicity and coherence through electric, electromagnetic and electro mechanical interactions, which are primary source for energy. Coupled electron transfer reactions and other cyclic process that occur in a nested space - time organization within the cell helps minimize entropy since, for a coupled molecular process the entropy production is zero.Intermolecular dipolar interactions among membrane bound proteins/enzymes, and nucleic acids which act as biological semiconductor devices; and quantum tunneling operate in many electron and proton transfer proteins.

I've been reading more on efforts to invoke quantum physics in explaining life, so on a recommendation I picked up this book.I found this to be is an engaging and thought-provoking book, extremely dense with information and ideas running from accepted science through increasingly speculative extrapolations and concluding with some free-form philosophizing. This book was published in 1993, with the second edition I read coming in 1998.The early sections of Ho's book discuss life in thermodynamic terms. I was broadly familiar with the idea that life utilizes energy flow

to build and maintain high levels of structural organization far from equilibrium. In several steps, and citing work of other scientists, she builds a case that explaining life in detail strains the traditional thermodynamic picture (which assumes microscopic homogeneity). She says intricately organized living things utilize molecular systems which transfer energy without thermalization (zero entropy growth). Energy is stored and used at the electronic level, not the thermal level. But how can these micro-level energy exchanges operate across the macroscopic dimensions of the organism? Ho says stored energy can amplify weak signals across larger distances.Throughout these early chapters, Ho uses the word "coherent" to describe the (non-thermal) energy storage and transfer within the organism (she says stored energy is by definition coherent energy). She will come back to this idea later in the book and explicitly argue that it must involve quantum coherence specifically.The energy we're talking about is electromagnetic. We know electrons move quickly and in organized fashion through crystals and super-cooled materials (superconductors).

African Farm The Complete Works of D. H. Lawrence (22 Complete Works of D. H. Lawrence Including Women in Love, The Rainbow, Sons and Lovers, Fantasia of the Unconscious, Aaron's Rod, Twilight in Italy, & More)