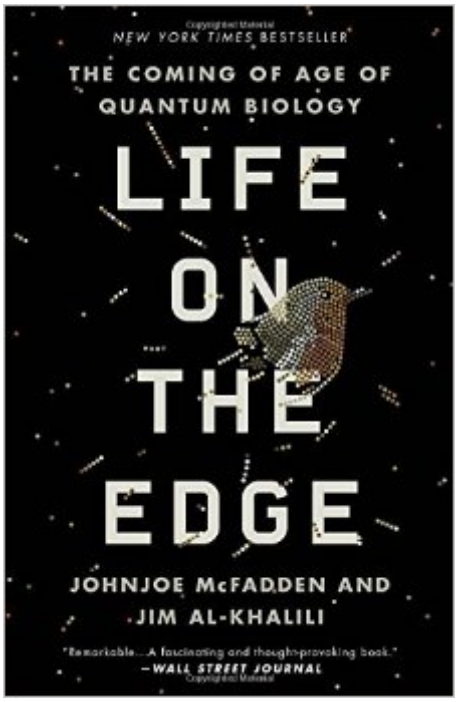
Life On The Edge: The Coming Of Age Of Quantum Biology



Synopsis

New York Times Bestseller and an Best Science Book of 2015Life is the most extraordinary phenomenon in the known universe; but how did it come to be? Even in an age of cloning and artificial biology, the remarkable truth remains: nobody has ever made anything living entirely out of dead material. Life remains the only way to make life. Are we still missing a vital ingredient in its creation?Â Â Â Â Like Richard Dawkins' The Selfish Gene, which provided a new perspective on how evolution works, Life on the Edge alters our understanding of our world's fundamental dynamics. Bringing together first-hand experience at the cutting edge of science with unparalleled gifts of explanation, Jim Al-Khalili and Johnjoe Macfadden reveal that missing ingredient to be quantum mechanics; the phenomena that lie at the heart of this most mysterious of sciences.Â Drawing on recent ground-breaking experiments around the world, each chapter in Life on the Edge engages by illustrating one of life's puzzles: How do migrating birds know where to go? How do we really smell the scent of a rose? How do our genes copy themselves with such precision? Life on the Edge accessibly reveals how quantum mechanics can answer these probing questions of the universe. Guiding the reader through the rapidly unfolding discoveries of the last few years, Al-Khalili and McFadden communicate the excitement of the explosive new field of quantum biology and its potentially revolutionary applications, while offering insights into the biggest puzzle of all: what is life? As they brilliantly demonstrate in these groundbreaking pages, life exists on the quantum edge.From the Hardcover edition.

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Customer Reviews

Quantum physics is certainly weird, but it isn't controversial any more. Quantum effects make technologies such as MRI possible. The authors do a good job of explaining the various physical quantum effects. The description of the famous two slit experiment is very clear in this book. Even though you find the results bizarre, you do understand what the results were and what they say about the quantum world.Quantum effects in biology do not seem bizarre. There is no additional weirdness, just quantum weirdness applied to minute biological processes. The authors focus on where and how quantum effects come into play, for example, in bird navigation or photosynthesis. The authors deal with the questions of why you need quantum physics rather than classical physics to explain specific results. They explain how a particular quantum effect achieves (or could achieve) a desired end. They explore how a tiny or animal cell can maintain quantum coherence (i.e. preservation of a quantum state necessary for quantum effects) long enough to allow the process to complete when physics labs cannot maintain quantum coherence for nearly as long despite massive equipment. Finally they explain how minute events can have a profound influence on living beings which are vastly bigger despite a general expectation in the scientific community that something tinier than a hair on a dog's tail could not possibly wag the dog.Aside from being easy and enjoyable to read, the book references published experiments and theoretical papers used in building up the narrative, including some papers which were published only months before the book was published. You get a feeling of observing the state of quantum biology just a few months ago.

The authors thought otherwise when physics colleagues tried to warn Jim Al-Khalili off this line of research. The headline for this review was taken from the December 2014 issue of Discover Magazine (pages 44-49) that explored the idea of these two physicists that quantum theory might possibly explain some of our bodies most fundamental processes.From the article again: "Usually the single atom sits closer to a molecule on one side of the DNA ladder than the other. Al-Kahlili and McFadden dug out a long forgotten proposal made back in 1963 that suggested that DNA mutates when this hydrogen atom tunnels quantum-mechanically to the "wrong" half if its rung. The pair built on this by arguing that, thanks to the property of superposition, before it is observed, the atom will simultaneously exist in both a mutated and non-mutated state - that is, it would sit on both sides of the rung at that same time".Science often advances because a scientist (in this case two them) sees something new and doggedly follows wherever it takes them. In this case they took an old idea from 1963 that at that time presumably hit a dead end. You rarely will read about total failures which must happen far more often, but we have short lifespans and spending 15 or 20 years of our most productive years pursuing a dream or line of inquiry is what makes for such a human interest story.I

suggest reading the Discover article because if you grasp the significance of this research you will most definitely want to read this book. The theory may better explain photosynthesis, some cancers, Parkinson's disease, and improve solar energy cells and so forth. Just those three areas would touch plant biologists and agriculture, medical researchers and electrical engineers.