Living at Micro Scale: The Unexpected Physics of Being Small

David B. Dusenbery
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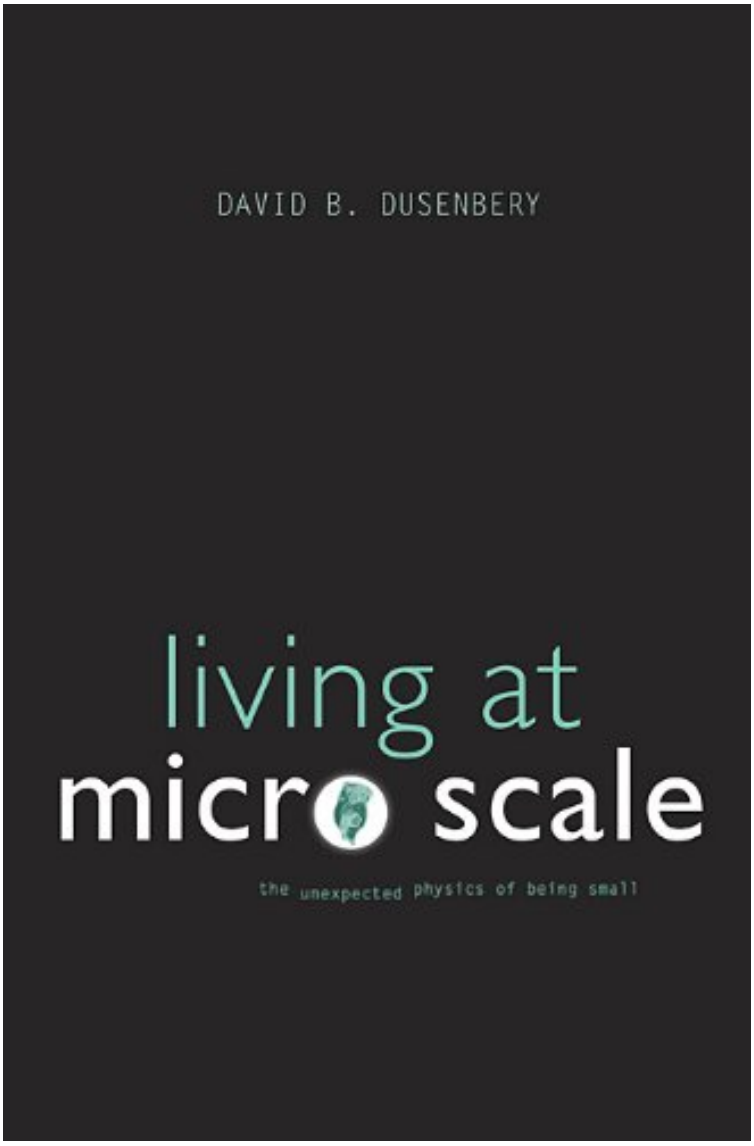

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David B. Dusenbery : Living at Micro Scale: The Unexpected Physics of Being Small before purchasing it in order to gage whether or not it would be worth my time, and all praised Living at Micro Scale: The Unexpected Physics of Being Small:

0 of 0 people found the following review helpful. Great book, living classicBy Dr. NikVery deep and thoughtful book about physics and biology. A great complement to my older book by H. Berg "Random walks in Biology".Such well-written books by scientists and for scientists become rare nowadays, because many authors prefer to simply compile

their papers into a volume and call it a book. This one is different, it takes deep historical and cross-disciplinary accounts on various scientific discoveries and disciplines: thermodynamics, microscopy, hydrodynamics, information theory, to mention a few. Written in a vivid narrative, with sufficient but not excessive mathematics through the text.

Kermit the Frog famously said that it isnt easy being green, and in Living at Micro Scale David Dusenbery shows that it isnt easy being smallexisting at the size of, say, a rotifer, a tiny multicellular animal just at the boundary between the visible and the microscopic. Imagine, he writes, stepping off a curb and waiting a week for your foot to hit the ground. At that scale, we would be small enough to swim inside the letter O in the word rotifer. What are the physical consequences of life at this scale? How do such organisms move, identify prey and predators and (if theyre so inclined) mates, signal to one another, and orient themselves? In clear and engaging prose, Dusenbery uses straightforward physics to demonstrate the constraints on the size, shape, and behavior of tiny organisms. While recounting the historical development of the basic concepts, he unearths a corner of microbiology rich in history, and full of lessons about how science does or does not progress. Marshalling findings from different fields to show why tiny organisms have some of the properties they are found to have, Dusenbery shows a science that doesnt always move triumphantly forward, and is dependent to a great extent on accident and contingency.

Of course biologists know that physical law constrains biological design. But the subtlety, the pervasiveness, the number and interrelationships of relevant factors-- these come as a splendid revelation in David Dusenbery's Living at Micro Scale. One is left wondering how we biologists could have managed to ignore them, and left grateful to Dusenbery for this enlightening account. (Steven Vogel, Duke University, author of Comparative Biomechanics: Life's Physical World)Using his deep knowledge of the principles of both physics and biology, Dusenbery provides novel insights into why biological systems are organized as they are. He has the uncanny ability to synthesize information that is common knowledge in physics, make a few simple calculations, and explain processes that have long puzzled biologists. Dusenbery shows how the tools of the physicist-- generalization and approximation-- and physics' rich repertoire of models can inform and advance biology. Biologists would do well to listen. (Terry Snell, Professor of Biology, Georgia Tech)I have long used Edward M. Purcell's famous essay to draw my students to the fascinating blend of biology, mathematics, and physics that deals with low Reynolds numbers. Now David Dusenbery's Living at Micro Scale provides me with a wealth of new material that combines simple mathematics, rigorous physics, and interesting microbiology. It will be indispensable to my teaching. Dusenbery uses evocative illustrations, and many lucid derivations and useful tables that will greatly increase the variety of examples that I can raise with undergraduates regarding microbe size, shape, propulsion, sensory ecology and encounter. The volume is sure to become a well-worn reference volume on my shelf, and one that will fuel many graduate seminars. (Peter A. Jumars, Darling Marine Center, University of Maine)The book draws on 20 years of Dusenbery's own research, and he doesn't compromise on the science; informed readers will find all the equations they could need. But it is rarely dry or uninteresting, and benefits from a liberal scattering of anecdotes going back 2500 years. My favorite is the idea that Galileo fell foul of the church because of his atomist view of matter. (Colin Barras New Scientist 2009-03-14)David Dusenbery's book Living at Micro Scale does an excellent job of explaining the physics that is relevant at this scale and, later in the book, how this physics affects the behavior of microorganisms...The book will be accessible and useful to a wide audience of people interested in biology, physics or engineering. And the provocative questions presented are sure to be the subject of intense activity in the research community for years to come. (Thomas R. Powers American Scientist 2010-01-01)About the AuthorDavid B. Dusenbery is Professor of Biology, Emeritus, Georgia Institute of Technology.