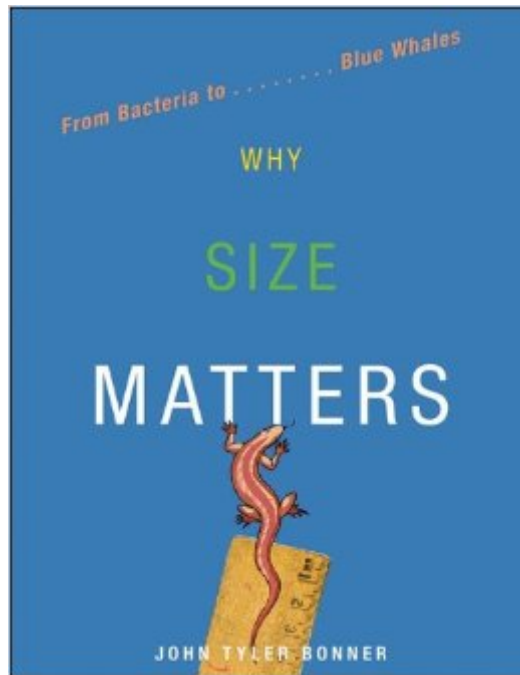


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# Why Size Matters: From Bacteria To Blue Whales



## Synopsis

John Tyler Bonner, one of our most distinguished and creative biologists, here offers a completely new perspective on the role of size in biology. In his hallmark friendly style, he explores the universal impact of being the right size. By examining stories ranging from Alice in Wonderland to Gulliver's Travels, he shows that humans have always been fascinated by things big and small. Why then does size always reside on the fringes of science and never on the center stage? Why do biologists and others ponder size only when studying something else--running speed, life span, or metabolism? *Why Size Matters*, a pioneering book of big ideas in a compact size, gives size its due by presenting a profound yet lucid overview of what we know about its role in the living world. Bonner argues that size really does matter--that it is the supreme and universal determinant of what any organism can be and do. For example, because tiny creatures are subject primarily to forces of cohesion and larger beasts to gravity, a fly can easily walk up a wall, something we humans cannot even begin to imagine doing. Bonner introduces us to size through the giants and dwarfs of human, animal, and plant history and then explores questions including the physics of size as it affects biology, the evolution of size over geological time, and the role of size in the function and longevity of living things. As this elegantly written book shows, size affects life in its every aspect. It is a universal frame from which nothing escapes.

## Book Information

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## Customer Reviews

John Tyler Bonner is an Emeritus Professor of Biology at Princeton University. This present general

consideration of the importance of 'size' in overall evolutionary development comes after years of close observation and study of cellular processes. For Bonner the complexity of an organism is measured by the number and kinds, the overall variety of cells which comprise it. Very simply, organisms of smaller size cannot have systems of operation of a kind that larger ones can. As he understands it 'size matters' and is a prime determinant of the shape and structure of the organism. This is his summary of the main theme of this work." Changes in size are not a consequence of changes in shape, but the reverse: changes in size often require changes in shape. To put it another way, size is a supreme regulator of all matters biological. No living entity can evolve or develop without taking size into consideration. Much more than that, size is a prime mover in evolution. There is abundant evidence for the natural selection of size, for both increases and decreases. Those size changes have the remarkable effect that they guide and encourage novelties in the structure of all organisms. Size is not just a by-product of evolution, but a major player. Size increase requires changes in structure, in function, and, as we will see, in other familiar evolutionary innovations. It requires them because they are needed for the individual to exist. Life would be impossible without the appropriate size-related modifications." Bonner goes on to explain why 'size' has been neglected as a subject of biological study. He gives general principles which indicate the overall importance of size.

It must be true that size is important; I can count on regularly getting e-mails that tell me I ought to be dissatisfied with my current size and that offer me just the potion to improve it. That's not the big issue in Why Size Matters: From Bacteria to Blue Whales (Princeton University Press) by John Tyler Bonner. "No one can escape the universal rules imposed by size," Bonner writes in the preface. Or, "To put it another way, size is a supreme regulator of all matters biological." There are aspects of size here that are surprising, and all the more so for most of them being in plain sight for any of us to have come up with. Bonner is a biology professor emeritus, who has concentrated his career on smaller animals ("I have devoted my life to slime molds," begins one of his other books) but takes up the problems and potentials of scale for plants and animals of all sizes, even imaginary ones. Bonner does not mention science fiction movies which have as staples terrifying oversized creatures; his fictional examples are residents of the lands visited by Lemuel Gulliver, both the Lilliputians, one twelfth of Gulliver's "normal" height, and Brobdingnagians, twelve times his height. He repeatedly shows that if these were real biological creatures, just because of size difference, they would have different skeletons, different intellects, different voices, different metabolisms, and different lengths of life. Size would make those creatures different in many ways that mere inches

could not measure. Bonner may draw many of his examples from Swift's fantasy, but his observations are all drawn from physics and biology. Increasing an animal's size always increases its complexity.

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