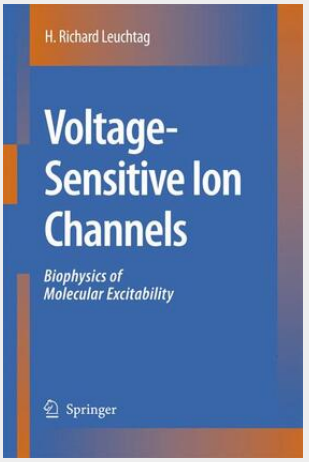
Leuchtag

Voltage-Sensitive Ion Channels

Biophysics of Molecular Excitability



The goal of this book is to explore the complexity of a microscopic bit of matter that exists in a myriad of copies within our bodies, the voltage-sensitive ion channel. We seek to investigate the way in which these macromolecules make it possible for the long fibers of our nerve and muscle cells to conduct impulses. These integral components of cell membranes are marvels of nature's evolutionary adaptation. To understand them we must probe the boundaries of physics and chemistry. Since function is intimately related to structure, we examine the molecular structure of channels, focusing on physical principles that govern all matter. With the application of genetic methods, our knowledge of ion channels has broadened and deepened. In the hope that research can help ameliorate suffering, we discuss the diseases that arise from channel malfunctions due to genetic mutations. This book is intended for students and scientists who are willing to travel into uncharted waters of an interdisciplinary science. We approach the subject of volta- sensitive ion channels from various points of view. This book seeks to give voice to the viewpoints of the physical and the biological scientist, and to bridge gaps in terminology and background. Readers may find this book to have both elementary and advanced aspects: For the reader trained in the biological sciences, it reviews background in physics and chemistry; for the reader trained in the physical sciences, it reviews background in physiology and biochemistry.

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