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**BOOK REVIEW**

## *INTEGRATED MOLECULAR AND CELLULAR BIOPHYSICS*

by Valerica Raicu and Aurel Popescu, Springer Science, 2008 (252 p.).

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Biophysics represents perhaps the best example of an interdisciplinary involvement of physics, integrating various topics like biochemistry, physiology, colloid chemistry, biology, etc. It is a fast growing, yet well established field, which came a long way before it became finally recognised as a physical science. Because of the recent explosion of so many new results in experimental biology, biophysics is extremely vast. For a graduate physics student or a researcher is a difficult problem to become familiar in a simple and rapid way with its main topics. The book by Raicu and Popescu is coming precisely with this aim: to facilitate a clear and unitary understanding of the biophysics as a "standalone" science within the broader family of physical sciences. This is, in my opinion, what makes this book so special and its publication so timely. This book is written in a simple and clear way but nevertheless based on very solid information. A general theme emerges from the entire book, one that proposes how simple physical principles can be used to describe the complexity of biological world.

The book is organised on eight chapters that integrate basic biological and biochemical information. The presentation relies on structures and processes rather than experimental techniques (which are also very well presented whenever is necessary). Thus the book introduces the reader to classical as well as new emerging topics in biophysics. In the opening chapter the authors focus on interaction occurring between biological molecules. Also this chapter contains an extensive presentation of water structure and dynamics, and its importance for the living systems. The following three chapters give a description of the cell, membrane structure, aspects of DNA structure and protein folding, and transport phenomena (including diffusion, osmosis, facilitated transport, etc.). Chapter 5 contains more mathematically oriented topics about reaction, diffusion, and dimensionality in biological systems. Here the nonlinearity and dimensions are the leading players, and modern approaches emphasizing some of the physical and biological effects introduced by nonlinearity, inhomogeneity and fractal dimensionality are discussed. Personally this is my favorite chapter, and I wish more chapters were treated from that angle. However, the authors were right to include the treatment of classical problems, which constitute the backbone of current biophysics, and on which more advanced topics can be treated, such as those presented in Chapter 5.

The electrophysiology of membranes of excitable cells is presented in a mathematical way in chapter 6, where results are based on experiments. Both chapter 5 and 6 contain very nice quizzes which will keep even the most diligent reader busy. The molecular basis of the action potentials discussed in chapter 6 is presented in some detail together with the structure of channels and ion pumps, in chapter 7. The last chapter introduces kinetic aspects of protein-protein interactions, and experimental techniques that are used in detecting them. Throughout the book, essential notions of biochemistry and biology are introduced gradually, while the reader familiarity with basic principles of physics is assumed.

Because of the clarity of the presentation, "Integrated molecular and cellular biophysics" can be relevant to a very broad audience, from college students to experienced researchers. In my opinion, any reader (with some basic knowledge in physics) even remotely interested in biophysics will be enthralled from the beginning of the book.

I therefore enthusiastically recommend this book to anyone interested in biophysics, either for research or teaching purposes (or both).

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