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BOOK REVIEW

Methods in Molecular Biophysics

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Methods in Molecular Biophysics, 2nd Edition, by Nathan R. Zaccai, Igor R. Serdyuk and Joseph Zaccai, Cambridge University Press, Cambridge, 2017, pp. xxiii + 684. Scope: textbook, £54.99, ISBN 978-1-107-05637-4 (Hardback). Level: senior undergraduates, graduate students, professional researchers.

Biological problems have been considered in the context of physics since at least the seventeenth century when e.g. Newton commented on information transmission along nerves. But it was the introduction of the double helix model of DNA, in the middle of the twentieth century, that demonstrating unequivocally that the processes of life are governed by basic physical principles. Since then, an immense number of specialised methods has been developed, applying physics to understand the structures and (to a lesser extent) functions of biomolecules. Zaccai *et al.* describe a wide variety of these methods in their comprehensive textbook.

The book is substantial. It is arranged as an Introduction and 12 Parts, with each of the Parts being divided into sub-Parts and smaller divisions. The sub-Parts form the main organisational units. Each of them starts with an historical review of the topic, describing the most important contributions and the scientists that made them, and finishes with a check-list of key ideas plus suggestions for further reading. So they are each to some extent self-contained, though there are also some cross-references between them.

The Introduction sets the context, historically, and then points out the amazingly wide range of scales applicable to biology. Timescales range from 10^{-15} s (for electronic rearrangement in vision up to 10^{16} s (molecular evolution); and lengthscales range from 10^{-10} m (an atom) up to 10^{6} m (the Earth as an ecosystem). Brief previews are given of some of the ideas to be introduced or used later including thermdynamics, hydrodynamics, the scattering of radiation, spectroscopy, single-molecule detection, and applications of biophysics to medicine.

On the nanoscale, traditional distinctions between biology, chemistry and physics as separate sciences melt away. Nonetheless, each subject retains its own distinctive language and culture, which can cause real difficulties in interdisciplinary projects. The authors are clearly sensitive to the problem, for they have included explanatory coloured boxes throughout the text, some of which are explicitly labelled as "Physicist's Box" or "Biologist's Box". This approach seems very helpful. Unexpectedly, I could find nothing about techniques for exploring the function of ion channels but, otherwise, the coverage of molecular/biophysical methods seems almost encyclopædic. It is written at a depth and understandability that should be useful to senior undergraduates, graduate students and researchers already working in other parts of the field.

The book is very attractively produced with clear typography and numerous figures, illustrations, and coloured comment boxes. The latter contain additional information that is not necessarily central to the narrative but nonetheless relevant and often of great interest, usefully extending the ideas in the main text. My only complaint is that where headings and sub-headings

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are printed in black on dark blue backgrounds, they are hard to read.

This second edition has had a new section added on medical imaging with the intention of encompassing the full range of topics covered in most medical school biophysics courses. The result is a wonderful achievement and probably as up-to-date and exhaustive as could possibly have been managed given the rapid scientific development of the field. So it is a pleasure to be able to commend it warmly to a new generation of young biophysicists.

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