Across the span of biophysical chemistry

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Biophysical Chemistry, in 3 parts. By C. R. Cantor and P. R. Schimmel. Pp.1,370. (W. H. Freeman: 1980.) Pt I hbk £17.70, \$31.95; pbk £9.20, \$16.95. Pt II hbk £20.70, \$37.95; pbk £10.60, \$19.95. Pt III hbk £22.40, \$39.95; pbk £11.90, \$21.95.

IT is difficult to give a simple definition of biophysical chemistry. Scientists who have considered themselves biophysicists have covered such a wide variety of subjects, from the physics of ion transport to crystallography, that it is difficult to settle on a satisfactory definition. To avoid narrowness, it is perhaps best to define the field as that in which physical methods are applied to the study of biological systems — molecules as well as larger aggregates. To date, such an immense number of physical techniques have been used in this way that it has been difficult to find a textbook which covers even a representative number of them. At the same time, the study of these methods must be coupled to a reasonably complete understanding of the structure and function of the objects under study — in most instances biological macromolecules.

Cantor and Schimmel have chosen to attack the problem of the breadth of biophysical chemistry by producing a three-volume work of nearly 1,400 pages. The concept is admirable. The first volume, entitled *The Conformation of Biological Macromolecules*, sets the stage by discussing in detail the structures to be studied by various physical methods. Here, the authors have in fact set one of the few limits to their scope by confining the discussion for the most part to homogeneous macromolecules. While the existence of macroassemblies is mentioned in appropriate places, this limitation seems reasonable in that most of the best illustrations of the applications of biophysical chemistry come from studies of homogeneous biological macromolecules. The authors on occasion indicate the power of the methods of studying subcellular particles or even whole cells, but this aspect is not emphasized. Hence the first volume is devoted primarily to discussion of protein and nucleic acid structure, polysaccharides, lipids and membranes being given rather less space. The treatment is thorough, starting with composition and chemistry of the constituent monomers and extending to the static structure of the polymers and on to a discussion of the forces that determine protein folding and nucleic acid structure.

Having set the stage by presenting the structures to be studied, the second volume, *Techniques for the Study of Biological Structure and Function*, presents the physical techniques required to determine the macromolecular struc-

tures. Since the methods covered are those used to derive the information in the first volume, a purist might quibble about the relationship of the cart to the horse, but as a learning format such an approach has an advantage, since the context for the application of these (bio)physical methods is clear beforehand. The number of physical techniques applied to one or another biological macromolecule has become so great that it is difficult to be all-inclusive, and Vol. II is not. In a number of specific areas the presentation is extensive, as for all types of optical spectroscopy; hydrodynamic techniques are also well covered. Approximately 130 pages are devoted to X-ray crystallography, including scattering, and to a short mention of extended X-ray absorption edge spectroscopy. This is a thorough and well-presented discussion.

In the magnetic resonance section, both NMR and EPR are covered. The EPR discussion is rather brief; no examples of transition metal EPR spectra are given and the student will have difficulty in understanding even the most basic aspects of the interpretation of EPR spectra from the material given. On the other hand, the NMR section gives an excellent presentation of the theoretical and basic aspects, including relaxation mechanisms. The applications section is not as good. Most of the spectra are out of date; NMR technology has improved so much that even ^1H spectra from the early 1970s do not do justice to the field.

The third volume is entitled *The Behavior of Biological Macromolecules*. The idea behind this section would appear to be that since the student now knows his structure and the methods for discovering it, he can now use this information to understand some of the more complex interactions of biological molecules. These include ligand binding to macromolecules (both equilibrium and kinetic aspects), the variety of "allosteric" phenomena involved in biological regulation, and conformational equilibria found in proteins, nucleic acids and membranes. Many specific examples of the various methods dealt with in Vol. II are given in Vol. III and make the discussion of applications of biophysical techniques more complete. This last volume also covers some other methods such as differential scanning calorimetry — an important addition. The extensive ^1H -NMR studies of t-RNA are presented here with spectra somewhat more up to date than those appearing in the NMR section proper.

The book is sufficiently mathematical to be relatively rigorous without overdoing it. There is an appendix giving a brief review of matrix algebra, and appropriate problems are found at the end of many of

the chapters, with answers in the back of each book.

Minor criticisms aside, one has to conclude that the three-volume concept of presentation was well-founded and that the execution is excellent. I believe that this will be the textbook of choice for a course in biophysical chemistry; I can think of no other text that is as complete or as consistently well done over such a broad spectrum of subjects. □

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Biochemical quartet

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Biochemistry: A Case Oriented Approach. 3rd Edn. By R. Montgomery *et al.* Pp.711. (C.V. Mosby: 1980.) Pbk £11.50, \$19.95. *Biological Chemistry: The Molecular Approach to Biological Systems*. By K.E. Suckling and C.J. Suckling. Pp.381. (Cambridge University Press: 1980.) Hbk £25, \$59.50; pbk £9.95, \$19.95. *Biochemistry and Physiology of the Cell: An Introductory Text*. 2nd Edn. By N.A. Edwards and K.A. Hassall. Pp.448. (McGraw-Hill: 1980.) Hbk £15.95, \$38.20; pbk £7.95, \$19. *A Guidebook to Biochemistry*. 4th Edn. By M. Yudkin and R. Offord. Pp.261. (Cambridge University Press: 1980.) Hbk £18, \$53.50; pbk £6.95, \$15.95.

OVER the past 10 to 15 years, many excellent biochemistry textbooks have appeared. To succeed in the face of such competition, any new book must be outstanding or have some unique and unusual features.

The general textbook by Montgomery *et al.* fits both of these criteria. As its title and the sketches of clinicians at work on its cover imply, it is aimed to serve the needs of students of medicine or other health-related subjects. Each chapter first presents a particular set of topics in much the same way as other, more conventional textbooks of biochemistry. This is then followed by discussion of various clinical conditions, questions and problems. The number and range of conditions covered in the book is impressive. The order of chapters is rather unconventional, starting with nutrition, followed by proteins and enzymes and the acid-base balance, before discussion of cellular metabolism and its regulation. It is explained that the introduction of these particular topics early in the book permits a wider range and fuller discussion of clinical cases in subsequent chapters. I cannot argue with this. The book is imaginative, full of information,