formed perm-selective membrane systems, the whole subject would collapse. Indeed, their application might well have collapsed had it not been realized that at least two kinds of liposome were needed as delivery agents, one whose surface was immediately recognized as being "foreign" and the other being "invisible." The former, together with its load of drug, would end up assisting the extraordinarily efficient macrophage system, while the latter would circulate around the body like an erythrocyte for many days giving a particular, well vascularized lesion a chance to be dosed. It is a pity that the "invisible" ones are referred to as being "stable"; stability has already been (correctly) assigned to some of their chemical and physical attributes contributing, in turn to their shelf life, see Appendix 5.

Part IV deals with "other applications of liposomes," and Lasic prefaces it by warning readers "to be critical of the data presented, particularly if not supported by scientific experiments." This reviewer thinks this somewhat too cynical an introduction to a Chapter entitled "Cosmetic applications of liposomes." Drugs and cosmetics appeal, ultimately, to their users, and a good bedside manner hurts no-one.

It is a remarkable volume, authoritative, informative, and comprehensive, if not just a little convoluted and expansive in its English.

Biophysique Moléculaire: Structures en Mouvement by Michel Daune

InterEditions, Paris, 1993. 583 pages. 232 French francs

Reviewed by Philippe F. Devaux, Institut de Biologie Physico-Chimique, Paris, France

There are several master text books in Biochemistry, Genetics, or Cell Biology. Yet, no one up to now had dared to write a text book entitled "Molecular Biophysics." This reflects a fundamental difficulty associated with the ambiguous limits of the latter discipline. Michel Daune, professor at the University of Strasbourg, who has a long experience of teaching in the area of molecular biophysics has attempted to fill the gap in his recently published book: "Biophysique Moléculaire. Structures en mouvement." According to Michel Daune, molecular biophysics should explain quantitatively all biological phenomenon at a molecular level from the laws of physics. This definition, I think, underestimates the historical aspects of life that should be taken into account. What I mean is that a physicist of genius, in his office, cannot deduce the way living systems are today on earth, from the laws of physics only. There are many different ways life could exist that are compatible with the laws of physics. Evolution is responsible for the organization of cells for the purpose of reproduction and survival. But the same arbitrariness prevails as in the building of a car. Thus, a book on molecular biophysics that pretends to explain the phenomenon underlining living organisms has first to describe how life is actually organized at a molecular level, that is, to include the content of a text book on biochemistry, genetics, and possibly also cell biology! What sense is there to describe, for example, the interaction of ions with RNA or the folding of proteins if the reader ignores what these macromolecules do? Thus, a certain frustration can result from the reading of such a book. By contrast, a book on molecular biology gives the impression of a world of semi-logic, where molecules interact to achieve a program. In fact, most people think they understand molecular biology because they know which molecule interacts with which. The important issue seems to be the identification of the molecules: their ultimate ID is provided by their sequence! That is precisely where molecular biophysics starts. The molecular biophysicist is supposed to explain how such molecules interact. For that purpose, he must know theoretical physical chemistry as well as the principles of sophisticated physical techniques. Indeed, molecular biophysics is closely associated with the idea of instrumentation. The abstract book of the 1994 American Biophysical Society meeting in New-Orleans states that a "prominent paradigm of biophysical research involves the elucidation of the structural basis of biological function, using physical methods." This clearly indicates that the emphasis on methods is a characteristic of biophysics. Unfortunately, in most cases these methods cannot be explained in simple terms.

My long introductory remarks are meant to explain that it is in practice impossible to write a completely satisfactory book on molecular biophysics. Either it is incomplete, with arbitrary choices of topics, or it remains at a low level and does not give any insights into the techniques nor on the function of the molecules described. Michel Daune has deliberately decided to minimize the developments concerning the techniques. He has chosen to provide undergraduate students in biophysics with a book containing the indispensable knowledge of physical-chemistry associated with the several domains investigated by molecular biophysicists. Through this introductory book, he gives them the keys that will allow them to start thinking in terms of physical chemistry about the problems of molecular biology. Knowledge of this level of culture is indispensable for communication between biophysicists who, at some stage of their career, will have to switch from soluble proteins to membrane proteins, from proteins to DNA or from lipids to proteins. The chapters of this book are useful introductions to the various areas and, at the same time, it shows that the same problems are encountered in different fields. For example, the influence of intermolecular forces, the role of ions, the problem of time scale, etc. But this book may not satisfy completely the reader who looks for a specialized area of biophysics and find "his question" only partially touched upon.

Part I is devoted to the conformation of biopolymers, with general considerations on intermolecular forces illustrated by an extended review on the conformation of nucleic acids. The chapter on nucleic acids, which covers Michel Daune's principal interest, is an excellent theoretical introduction to that important topic which makes the link between molecular biophysics and molecular biology. The next chapter is a less developed discussion on protein conformation. Perhaps because of lack of space, Michel Daune has left out the structure of membrane proteins. It is true that much less is known presently on the structure of hydrophobic proteins than on soluble proteins. However, it is the object of many modern studies in biophysics and illustrate quite well general principles on hydrophobicity. Part II of the book is devoted to the dynamics of biopolymers with a theoretical section and a review of a few experimental approaches, from which NMR has been excluded because it would be too complicated to summarize. As suggested in the title of this manual, dynamics of biological macromolecules is as important as their structures. Life requires movement. Michel Daune has rightly emphasized this aspect. The third part gives an overview about polymer hydration, also a very general and fundamental problem in biophysics. This allows Michel Daune to tackle the problem of amphipaticity and to give some insights onto lipid organization in an aqueous medium. The membrane community, to which I belong, will complain, of course, about the quasi-absence of a real membrane section in this book. To illustrate this weakness, it is interesting to note that the index contains neither the word "membrane" nor the word "phospholipid." Of course, it is reasonable that the author of a book develops the topics he is more familiar with; but the title of the book has to be adjusted in consequence.

Part IV is a more extensive study of polymer-ion interactions. Michel Daune presents in an understandable way the various theories underlining polyelectolytes interactions with macromolecules as well as ion conductivity through membranes. This is an important general topic of molecular biophysics. Finally, the last part of the book deals with the general theme of association between molecules; it includes classical theories of enzymology, but leaves out the difficulties associated with reactions taking place in the inhomogenous environment that prevails in cells.

The book contains some developments written in the form of exercises, and each section is completed by a small bibliography, which is quite useful, although of course the reader will not find the most recent references. A mathematical appendix is added at the end. Indeed, this book, although designated first for biochemists and biologists, deals with some concepts of physics requiring a minimum of mathematical formalism. Throughout the book, figures, including structure representations, are in black and white, which is not the most attractive type of presentation but is certainly the cheapest. A book written in French suffers from a lower impact than an English written manual and, therefore, economy is necessary.

In summary, Michel Daune's book is a useful reference book for students and researchers, who will find the physical basis of most problems of molecular biology. Perhaps Michel Daune should have associated his effort with that of one or several other contributors to present a complete view of the field. Nevertheless, provided one reads French, I recommend having this book on the shelf.

Muscle Contraction by Clive R. Bagshaw

Chapman & Hall, New York, 1993. 155 pages. $27.50

Reviewed by Vincent A. Barnett, Department of Physiology, University of Minnesota Medical School

The first edition of "Muscle Contraction" by Clive Bagshaw was written as part of an outline series in biology and limited to 80 pages. Despite these limitations, Dr. Bagshaw created a book that was a marvel in its concise yet remarkably up-to-date distillation of the state of the field at that time. The book gave a clear exposition of the basic structural, biochemical, and mechanical features of muscle cells. It also outlined the major theories concerning the coupling of muscle biochemistry to function, and the experiments that led to and/or supported these models. That slim volume was a great aid to instructors and students, because it provided an easily digested basis set of information for those interested in the study of the molecular mechanism of muscle action. With the second edition, Chapman & Hall have given Dr. Bagshaw a little more room to work with his material, yet he has resisted the temptation to generate an unwieldy tome. Instead, the new volume clings to the spirit of the first edition by presenting the updated material in a clear and minimalistic fashion. Although the page count has nearly doubled, the current edition of "Muscle Contraction" can hardly be described as massive, especially considering the breadth of material covered. In blending the new material into the framework of the previous edition, Bagshaw has continued to follow the shortest path to the exposition of the fundamental concepts and critical experiments.

In the decade between the first and second editions, new sarcomeric proteins have been identified, and significant new advances have been made concerning the structures of actin and myosin as well as the techniques used to examine their interactions. All of this has been placed its proper context in the second edition. The relatively new data from the crystal structure of G-actin and the implications of this data in the structure of F-actin are clearly described. Given Bagshaw's gift for clarity, it is almost a disappointment that the distribution of this book began just before the publication of the structure of the myosin head (Rayment et al. *Science.*