knowledge of rubber technology with emphasis on the processing, compounding and manufacturing of rubber products rather than on the chemistry and physics of rubbers, although the basic facts and theories of the latter must be adequately, though briefly, covered". In general, it seems that the objectives of this brief have been satisfactorily met. Subjects which have been deliberately omitted from the book include lattices, ebonite and adhesives. Engineering applications of elastomers have deliberately received "scant" treatment only, on the grounds that many conferences have been held and several books published on this subject in recent years.

The subject unfolds in a logical manner. Introductory chapters deal with the history of the rubber industry, an outline of rubber technology, and rubber physics. Then come chapters on raw polymers, vulcanization, compounding materials, reinforcement, machinery and production technology, compounding and manufacturing techniques. The book concludes with chapters on testing procedures and standards, and professional, trade, research and standards organizations.

Being the work of thirty-two separate authors, the book inevitably has some repetition and some unevenness of treatment. A stronger editorial hand could undoubtedly have been wielded. Thus, for example, the important phenomenon of swelling of elastomers is dealt with separately in several different places, and in no case is the treatment satisfactory. Furthermore, in discussing the determination of crosslink density by swelling, no mention is made of the important method of swollen compression modulus (which provides an effective procedure for eliminating the Flory χ-factor). Again, plastimeters are dealt with in two separate chapters, and space wasted through overlap could have been put to better use in amplifying some of the issues raised.

D. C. BLACKLEY

Safety in Numbers

Physical Biochemistry. By Edward Kensal Van Holde. Pp. ix+246. (Prentice Hall: Englewood Cliffs, N.J., July 1971.) $9.75 cloth. $4 paper.

THE achievements of molecular biology during the past two decades are too well known to need enumeration; it may well be asked, however, what contribution the physical chemist has made to all the excitement. Faced with the Augean stables of biological systems, the molecular biologist has been presented first with the problem of separating and assaying minute amounts of chemical species differing in but subtle ways. The solution of these problems would have been unimaginable without the efforts of a whole generation of physical chemists. But if you scratch a physical biochemist you are likely to find a polymer chemist or spectroscopist beneath the skin. Such preoccupations have of course led to many notable advances, but all too often the physical biochemist has left the dangerous waters of real biological systems to measure the size and shape and properties of proteins and nucleic acids, uneasily steering a course between the shoals of biological irrelevancy and sheer unanalysable complexity.

This brief and unpedantic book leads the embryo physical biochemist down similar traditional byways. After a quick review of classical thermodynamics it provides some insights into the implications of the Boltzmann distribution and the second law, an introduction to solution thermodynamics and a page or two on the nature of macromolecules. After this prolegomenon the author discusses chemical equilibria with a useful section on multiple equilibria and a mention of cooperative helix coil transitions. Then the traditional preoccupations return with a concern for the theory and practice of various methods of investigating the size and structure of macromolecules. Thus the last two sections deal with transport processes and with the interaction of radiation with biological matter. In passing, the principles behind various separation methods are discussed.

There is, oddly, little on the polyelectrolyte nature of biological macromolecules and nothing on surface chemistry or kinetics. The reader should know something about proteins and nucleic acids, but in case he doesn't, he is frequently referred to other volumes in this series (Foundations of Modern Biochemistry).

The style is lucid and informal with the occasional well chosen metaphor, but the high flown phrase is eschewed. The text is illustrated with pictures of pretty girls standing by pieces of apparatus and clear and elegant diagrams in green and grey. The reader should know about integral signs and partial differentials but may rest assured that, when the going gets too tough, rigorous analysis is neatly evaded by reference to higher texts. In the final section, quantum mechanics hovers in the background, letting drop the occasional arcane pronouncement. The text is not overburdened with references but there is a useful reading list at the end of each chapter together with a selection of numerical problems—without answers. I noticed a few misprints but no serious errors.

The biochemist endeavouring to understand the physical methods he encounters in his reading will find this book useful and it may be recommended to final year biochemistry students. The serious physical chemist will, however, prefer a more solid text.

E. G. RICHARDS

Chemistry Evolution

Biochemical Coevolution. By Kenton L. Chambers. (Proceedings of the Twenty-ninth Annual Biology Colloquium, April 26–27, 1968.) Pp. x+117. (Oregon State University: Corvallis, December 1970.) $5.

IN a respectable enthusiasm for the study of biochemical mechanisms, from the replication of DNA to the contraction of muscle, biologists have recently tended to neglect the precise and marvellous manifestations of evolutionary adaptation. It is therefore refreshing to find a book that points the way to studying these phenomena at the biochemical level. The book does not do more than point the way, and nobody should be misled by the title into supposing that its biochemical content is very great. Nevertheless it is a tantalizing introduction to a subject that must surely become more important during the next decade.

The book reports the proceedings of a symposium, and in common with others it harbours a motley collection of papers. In the first essay, P. R. Ehrlich manfully and almost successfully sets out to develop a theoretical framework on which the remainder can be hung. He has interesting things to say about the evolutionary interactions between plants and herbivores, predators and prey, parasites and hosts, flowers and pollinators. The second essay, by C. H. Muller, is a fascinating account of the airborne and waterborne toxins by means of which some plants inhibit the nearby growth of others. S. J. Karakashian writes the inconclusive history of the relations between a symbiotic alga, *Chlorella*, and its invertebrate "hosts". L. P. Brower, in the most thorough and closely reasoned contribution, summarizes his studies on the assimilation by Danaine butterflies of cardiac poisons from their food plants, and explores the effects of this assimilation on the interactions between the butterflies and their predators. Finally, C. H. Dodson describes his elegant work on the nature and species-specificity of the volatile substances by which orchids attract their insect pollinators.

In 1949, with characteristic prescience, J. B. S. Haldane drew attention to the unexplored territories of biochemical coevolution. More recently, the discoveries of enzyme polymorphism, and other aspects of protein evolution, have demanded a clearer knowledge of these territories. The studies reported in this book represent a few tentative forays, hopefully to be followed by more extensive colonization.

BRYAN CLARKE