The Biochemistry of the Nucleic Acids (11th Edition); by Roger L.P. Adams, John T. Knowler and David P. Leader. Chapman 

The authors have continued to select their material to fulfil the requirements of advanced undergraduate, and graduate, students in biochemistry, genetics and molecular biology. In so doing, they have succeeded in producing a reasonably up-to-date text, with many literature references to March 1991 at the end of each chapter.

Like the preceding 10th edition, the present one includes an extensive Appendix which describes many of the widely employed modern experimental techniques, such as sequencing of nucleic acids, restriction mapping, the polymerase chain reaction, cloning of DNA and its analysis and manipulation, the use of cell-free systems for studies of translation and transcription.

The book is very readable and profusely illustrated, and embraces most of the current trends in molecular biology. Its publication in paper-back form is to be commended in that it makes it more accessible to students.

David Shugar

Crystallization of nucleic acids and proteins. A practical approach; edited by A. Ducruix and R. Giegé, Oxford University 

Lots of good luck, plus facial hair and dandruff (to provide nucleation centres), were facetiously recommended as the essential requirements for successful crystallizations of biomolecules. Ducruix and Giegé set out in this text to prove that such crystallizations can now be considered as a science, with well-established principles, rather than an art. They argue that the principles of crystallization (crystallogenesis) are well established and that this text is produced in such a way that all molecular biologists who have access to macromolecules might attempt crystallizations using the protocols and concepts underlying them.

If the intention of the editors is to make crystallization methods more amenable to the beginner, then, even in the introductory chapter (Table 1), some twenty-three parameters that might influence crystallizations, and their success or failure, are listed. In addition, comments that indicate that crystallization vessel geometry or biological origin of the macromolecule can significantly affect the chances of success, would frighten anyone. It is also interesting to note that the index contains 31 pages of references to hen egg lysozyme; the reader must feel that this is the only protein to have been thoroughly studied in its crystallization behaviour.

One's sympathy extends to the editors for the difficult task of producing anything like a coherent volume for such a difficult and poorly documented topic. Many chapters do, however, contain useful protocols, hints and descriptions of experimental instincts, which are all too important in macromolecule crystallization.

After a woolly, scene-setting introduction chapter by the editors, general purification aspects and criteria are covered by Lorber and Giegé, followed by an attempt at a statistical evolution of protein crystallizations, using the notion of averages of replicated experiments, presented by C.W. Carter Jr. Carter writes bravely, including some provocative and superfluous comments ("the crystal grower is, relatively speaking, considerably more ignorant than the industrial chemist": a non-sequitur and an ill-explained comment) and at no time in the whole chapter is the behaviour of any specific biological macromolecule described or judged in the light of the principles present: do they work, is the question?

A highly informative, useful and well-illustrated chapter from the editors on methods of crystallization brings the sequential reader of this volume back to practicalities; how to prevent air-bubble entrapment in dialysis buttons and how to prevent crystal warming with a binocular microscope, are examples.

Then begin descriptions of what to do next if primary crystallizations fail or more sophistication is needed, for example seeding, described with clarity by Stura and Wilson, and crystal growth in hydrogels described by Robert, Provost and Lefaucheux, who do not state the reason why gel crystallization should even be considered until Section 3 of their chapter.

Two chapters on specific biological macromolecules are presented, with the problems of nucleic acid crystallizations described by Dock-Bregeor and Moras and membrane proteins by Reiss-Hudson. Unfortunately, Reiss-Hudson is led into the trap of making prejudiced statements involving the role of lipids in crystallization, assuming that they inhibit crystal formation when no evidence is available for the statement. Indeed, porins, from recent work by Rosenbusch and colleagues, readily crystallize with various lipids.

Some general aspects are presented in Chapters 9, 10 and 11 on phase diagrams, the physical chemistry of protein crystallization and, most usefully, crystal soaking. Sawyer and Turner admirably bring the uninitiated back to earth with a description of X-ray analysis; a huge topic in 34 pages. Presented with clarity, it was, however, disappointing to see a wholly inadequate description of the thorny phase problem. Nonetheless, the beginner would feel well advised to start reading this volume at this chapter, the rest of the volume almost falls into place after this excursion.
The general principles of automation in crystallization are described by Ward, Perozzo and Zuk in an enthusiastic, but ill-described way; could one actually do these manipulations without precise practical details after reading the chapter? Finally, an esoteric and end-of-the-line way of producing heavy metal-like crystals is presented by Doublie and Cater, using selenomethionyl derivatives, although rather highly specific criteria are needed for their use.

On the whole, the five chapters co-written by one or other editor, have a positive and confident air about them. The other authors who discuss crystallization itself do not seem to share such confidence or predictability about crystallization.

A measure of the success of such a book is to ask whether a new worker wanting to carry out crystallizations on their macromolecules would feel inspired and sufficiently informed to do so after reading this volume. My guess is not immediately, but the newcomer would be much more informed when seeking practical help from someone who really is doing crystallizations, learnt, presumably, from an expert at first hand.

A. Watts


This volume is the second part of a miniseries on the Mechanism of Catalysis. It contains eight chapters on different types of enzyme reactions: phosphate ester hydrolysis, nucleotidyl- and phospho-transferases, glycosidases and glycosyltransferases, enzymic carboxylation and decarboxylation, enzymic carbon--carbon bond formation and cleavage, enzymic free radical mechanisms, molecular mechanism of oxygen activation by P-450, mechanism of NAD-dependent enzymes. In addition there are two more general chapters on metal ions at enzyme active sites and on transient state kinetics.

A very good opportunity was missed by the editors and the author of chapter I on the kinetics of transients. There are many papers in the literature describing applications of these methods to reactions of some of the enzymes discussed in subsequent chapters. However, the examples chosen to illustrate both the methods and their application read more like a curriculum vitae of the author than a survey of important points. Clearly the author has done some beautiful experiments, but it is difficult to imagine a description of, for instance, the flow-quenching technique, without referring the reader to the work of Barman, Travers and others who have presented the basic principles.

Clearly, a reviewer will find more faults in chapters within his field of expertise and I shall limit my criticism to essentials. Apart from the lack of perspective, there are other aspects of chapter I with which one can take issue. There is a curious statement that there is no analytical solution to the general rate equation for (irreversible) second order reactions. This is derived in every elementary text on kinetics and there is no detailed referencing to such texts. The authors advice about the use of numerical solutions for many problems leaves much to be desired. I can visualize an ever increasing number of fallacious kinetic interpretations by those who feed equations that do not apply to their mechanism into computer programs they do not understand. Computer methods are useful to check deviations from pseudo first order conditions or the error due to the quadratic equation approximation, but they are no substitute for understanding what you are doing.

The chapters on various specific reactions are very much in the style of organic biochemistry, in contrast to treatments of enzyme mechanisms in terms of protein structure, function and molecular recognition. This is not a criticism, there are informative discussions of all the reaction mechanisms listed in the table of contents. Again, any reviewer will wish some or other discussion carried into greater detail. More could have been said about the chemistry of CO₂ and bicarbonate, as well as about the experiments carried out to elucidate the correct substrate/product for carboxylation/decarboxylation reactions. Again, here and elsewhere there are few links to the contribution of modern kinetic methods to reaction mechanisms.

The completeness of the cover of mechanisms of enzyme catalysis cannot be judged from this volume alone. However, the chapters under review can be recommended as authoritative treatments.

H. Gutfreund


Amphibia have been a popular model system for investigating biological phenomena for many years and the frog, *Xenopus laevis*, is the animal of choice in many laboratories. With the recent availability of genetic markers allowing identification of presumptive tissues and the purification or cloning of signalling molecules capable of altering axis specification in early embryos, interest in *Xenopus* biology has spread, and rapid advances in the techniques used to study this animal have been made. Against this background a new book which describes almost all areas of *Xenopus* use is most welcome.

The book consists of some 32 chapters by 67 different authors who are well known in their respective fields. Although little concerning adult frogs is mentioned, almost all aspects of the use of *Xenopus* oocytes, embryos and cell lines are described in