

## Enzyme mechanics

*Enzyme Structure and Mechanism.* By Alan R. Fersht. Pp. 370. (Freeman: London, 1977.) Hardback £10; paperback £4.95.

IN the past twenty years there has been an enormous increase in the knowledge about the structure and mechanism of action of enzymes, but it is only in the past few years that a real understanding of how enzymes attain their huge catalytic rates is beginning to emerge. Perhaps it is this fact that is responsible for the plethora of books about enzymes that have been published recently; however, few books deal adequately with this topic at the student level. Dr Fersht was obviously aware of this problem and this book is his attempt—generally successful—to overcome this deficiency.

The book starts with a good general introduction to the three-dimensional structure of enzymes and some information on the X-ray diffraction methods used; but as the structure of enzymes is part of the fundamental background to this book one would have liked much more detail of the methodology involved. The author then proceeds to discuss the concepts of chemical catalysis, emphasising the importance of the transition state theory in the interpretation of reaction mechanisms and also the importance of general acid/base and covalent catalysis for enzymes. It is a pity that the part devoted to covalent catalysis was restricted to only a few of the structures found in enzymes, and to complete the picture something should have been said about flavins, biotin, folic acid and cyanocobalamin.

The weakest part of the book undoubtedly lies in the sections dealing

with the steady-state kinetics of enzymes. The author deals almost exclusively in terms of the equilibrium model and his representation of the reaction schemes (3.4, 3.10) are not only misleading but incorrect. The part that deals with multi-substrate systems is very scanty, and nothing is said about product inhibition. In view of the importance that the author attaches to the steady-state kinetic constants later in the book, it is surprising that he does not present better methods for abstracting these constants from experimental data. The chapter on practical kinetics is also unsatisfactory as initial rate is never defined and potential difficulties in its measurement never discussed. The weakness of this section makes me hesitate to recommend this book as a general text for senior undergraduates.

It is in the last part (chapters 9–12) that the author comes into his own and in which the greatest strength of the book lies. Here Dr Fersht deals with enzyme specificity and the theories of enzyme catalysis from the point of view of the transition state theory, and underlines the importance of entropy changes as the key to the large rate enhancements caused by enzymes. This treatment of a complex topic is lucid, comprehensive and amply illustrated with examples, although unnecessarily restricted to those enzymes the crystal structures of which have been solved.

In many ways this is an admirable book and one to be highly recommended, but a certain bitterness and lack of balance renders it less useful for the more general reader.

Bruno A. Orsi

*Bruno A. Orsi is Senior Lecturer in Biochemistry at the University of Dublin, Ireland.*

## Enzyme kinetics

*Steady-State Enzyme Kinetics.* By Stanley Ainsworth. Pp. 255. (Macmillan: London, 1977.) £10.

A NUMBER of new books on enzyme kinetics have been published over the past few years, most of which have been reviewed in this journal (see *Nature*, 258, 551, 1975; 259, 255, 1976; 261, 530, 1976; and 268, 86, 1977); and a field which was once quite poorly served now has a wide choice of textbooks with different approaches. Because of this it would be hoped that any new book on this topic would make an original contribution either in its ability to explain concepts which many students find difficult or in providing new insights into the procedures of kinetic analysis. It is to this latter aspect that this book, which is intended for advanced undergraduate and graduate students, makes a particularly valuable contribution.

Except for a relatively brief introductory chapter on the nature of enzyme catalysis, the book is restricted to the treatment of steady-state and equilibrium kinetics with single and multi-substrate reactions, branched reaction mechanisms, isotope exchange methods and cooperativity being considered in detail. Unfortunately the treatment is somewhat uneven, and the sections on the effects of pH and temperature on enzyme activity are, for example, perhaps too brief to be adequate for the more advanced students. The derivation of the kinetic equation for the simplest single-substrate mechanism seems at first reading to be unnecessarily complicated, and I am afraid that many students might be put off the book at this stage, in favour of those providing more accessible treatments. The necessity for this approach, however, becomes apparent in those chapters in which the author develops his own methods for the presentation and analysis of kinetic mechanisms. It is in this area that the main



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