

of the relevant discussions at the symposium. In general, some papers contain a considerable amount of experimental detail, whereas others are mini-reviews of a particular aspect of conjugation.

The first section considers arene oxide metabolism (4 papers), particularly the role of conjugation reactions in the metabolism of the environmental carcinogen benzo[a]pyrene. Glycoside conjugation reactions (3 papers) presents evidence suggesting that oestrogen glucosides may be involved in the intracellular transport of the steroids. Bilirubin glycosides are reviewed, and the relationship between the conjugation and excretion of bilirubin is discussed. The glucuronyl-transferase activity of human lymphocytes is reported. Four papers follow on conjugation reactions with amino acids and their derivatives: the role of ligandin (glutathione *S*-transferase B) in hepatocarcinogenesis, the enzymology of glutathione *S*-transferase A and taurine *N*-acyltransferase, and structure-metabolism relationships in amino acid conjugations. Genetic variability in drug metabolism (3 papers) includes work on the genetics of drug acetylation and bilirubin glucuronidation.

Current interest in the nature of UDP-glucuronyl-transferases is reflected by a long section (some 100 pages; 9 papers) on this topic. Perinatal development, heterogeneity of the enzyme, and the influence of microsomal membrane structure, heavy metal salts and UDP-*N*-acetylglucosamine on glucuronidation are critically evaluated with reference to the possible

regulatory mechanisms for this family of enzymes in vivo. Conjugation reactions in isolated cells (4 papers) deals mainly with glucuronidation and sulphation in hepatocytes.

The problems encountered in the biochemical characterisation of enzyme systems involved in drug biotransformation are discussed in a section (some 100 pages; 11 papers), which includes 3 papers on the properties of purified UDP-glucuronyltransferase and one on the control of intestinal glucuronide biosynthesis that are complementary to those above on the nature of this enzyme. Also in this section are papers on sulphation, the use of fluorescent probes and liposomes for the study of microsomal enzymes, the effect of carbon disulphide on liver microsomes, and the similarity of D-glucuronolactone dehydrogenase and aldehyde dehydrogenase. The final section discusses the pharmacological and toxicological implications of conjugation reactions (5 papers); the relationship of conjugation to the toxicity and metabolic activation of xenobiotics.

The wide coverage of the conjugation reactions and their biological implications found in this interesting and informative volume reflects the important role of conjugations in the metabolism of the wide variety of chemicals to which modern man is exposed. It will be a valuable reference book to all concerned with the metabolism of biologically active chemicals.

Peter Millburn

Enzymatic Reaction Mechanisms

by C. Walsh

W. H. Freeman; Reading, San Francisco, 1979

xv + 978 pages. £18.30

For a long time there has been a conspicuous gap in the texts available to teachers and students of biochemistry. The standard biochemistry texts make a greater (or lesser) attempt to indicate the precedents for enzyme-catalysed reactions in classical organic chemistry but seldom explore the subject in much depth. However the texts devoted specifically to consideration of the mechanisms of biological reac-

tions, such as for example that by Bruice and Benkovic, have been written by authors whose initial training was in the area of physical or organic chemistry and who have only latterly developed an interest in biological systems. Hence such texts tend to lack the insight of an author whose experience has been obtained primarily in a biological context and who has worked with the more complex and less tractable enzymes

that tend to be avoided by chemists. Hence it seems to me that Dr Walsh's book fills not only the gap in the treatment of the mechanism of biological redox reactions to which he alludes in the introduction but also a more subtle one in respect to treatment of the entire subject of enzymatic reaction mechanisms from a biochemical, as opposed to a chemical, point of view.

The thesis which underlines the organisation of this text is the fundamental similarity at the mechanistic level of many enzyme-catalysed reactions which may appear at first sight to have little in common to the uninitiated. Dr Walsh has exploited this theme well although in some cases one may quarrel with its application. However the benefits of rationalisation far outweigh the minor problems created. Hence following an initial section devoted to discussions of fundamental aspects of enzyme kinetics and catalysis there are four main sections devoted, respectively, to enzyme catalysis of group transfer; redox reactions, elimination, isomerisation and rearrangement; and carbon-carbon bond formation and breakage. Such a classification follows of course closely that used in the publication 'Enzyme Nomenclature' although several classes, which are separate there, are brought together in this book with considerable advantage.

Extensive cross-referencing is employed both within

and between sections so that relationships are made apparent for cases where a given enzyme may show mechanistic features characteristic of more than one category. The beginning of each section contains a summary of the concepts presented in that section and the text is liberally illustrated with simple diagrams which I found particularly easy to follow. In fact the text makes extremely facile reading and I was continually struck by the sympathetic and relaxed way in which the subject is presented. It may well be that the expert will accuse Dr Walsh of over-simplification in some areas but there is no doubt that he will draw students into this subject in a way that other authors have failed to do. Apart from some trivial misprints my only major reservation is a chapter on the chemical logic of metabolic pathways which forms a curious addendum to the final section and which adds nothing to the overall presentation. One hopes it might disappear in a revised version.

I have no hesitation therefore in recommending this book to anyone wishing to obtain a broad and basic understanding of the mechanisms of biological reactions. I think it will be of particular value to students and, although perhaps too bulky to serve as a required text, I hope it will be made widely available to them through library purchase.

M. C. Scrutton

Plasma Proteins

Edited by Birger Blombäck and Lars Å. Hanson
Wiley; Chichester, 1979
xvi + 401 pages. \$62.00, £22.50

This monograph, to which some twenty authors mostly Scandinavian have contributed, was published originally in Swedish in 1976. It suffers from occasional infelicitous translations which lead to ambiguity and to some erroneous statements. Since the subject matter is predominantly confined to a consideration of human plasma proteins the inclusion of 'human' in the title would have been apposite.

After a short historical introduction the book is divided into five main parts: industrial plasma fractionation methods; transport proteins; immunoglo-

bulins; proteins concerned with coagulation and fibrinolysis; and plasma proteins as diagnostic aids.

In addition to their fundamental structural biochemistry the more physiological and clinical aspects of the transport proteins is described in a well-balanced account, especially of those involved in haem metabolism. This pattern of arrangement is advantageously followed in other sections.

Under the heading of immunoglobulins there is a lengthy discussion of immunological mechanisms embracing such matters as cell-mediated immunity,