Advances in metabolism

The Year in Metabolism, 1977. Edited by N. Freinkel. Pp. 448. (Plenum Medical: New York and London, 1978.)

THIS volume is the second in what is proposed to be an annual series, the purpose of which is to review advances in metabolism. The publishers have assembled an impressive list of internationally recognised experts to produce twelve chapters on diverse topics. The appeal of a series like this depends not only on the appropriate choice of subjects;in order to attract the non-specialist, recent advances have to be made intelligible to those without extensive background knowledge. In both respects this volume is largely successful. If there is any unevenness of presentation it is because some of the authors have interpreted their brief literally and dealt only with recent advances, whereas others have written general reviews with extensive references to the earlier literature.

The review by Murad and Aurbach on cyclic GMP metabolism, particularly in relation to disease states, is timely and draws together data which is not readily to be found elsewhere. The chapter by Fajans on diabetes mellitus provides a useful account of genetic aspects and the linking of susceptibility with the HLA system and a possible viral aetiology. Insulin resistance is also discussed together with various aspects of treatment, and there is a good account of possible pathogenic mechanisms in the development of vascular complications.

Another chapter contains an authoritative account of glucagon and somatostatin by Unger. Topics discussed include structure-activity relationships, control of secretion and the bi-hormonal (glucagon and insulin) hypothesis of diabetes mellitus. Inevitably there is some overlap with the chapter by Feligand Koivisto on body fuel metabolism, in which the inter-relationships of glucagon, insulin and somatostatin are considered. Hirsch writes about obesity, discusses what is new and concludes not much. His philosophical discussion of causation and treatment ends on a pessimistic note for the sufferer. Lipids and lipoproteins are discussed by Goodman who selects highlights from a complex subject with care.

Rosenberg's chapter on amino acid discorders also selects a few topics for discussion, including phenylketonuria, the glutamyul cycle and oxoprolinuria. He also gives a fascinating account of the metabolic mechanisms underlying Jamaican vomiting sickness, which is due to the presence of the unusual amino acid, hypoglycin, in unripe ackee fruit.

Seegmiller offers an extensive and detailed account of how human disorders of purine and pyrimidine metabolism are linked to an immunodeficiency syndrome. Possible mechanisms are discussed.

The topic of divalent ion metabolism is covered expertly by Coburn, Hartenbower and Kleeman, who draw attention to how recent advances in vitamin D metabolism are enabling some of the clinical disorders to be better understood. The complex inter-relationships between PTH, vitamin D and calcium, phosphate and magnesium metabolism are summarised. Winick deals with the topic of nutrition, growth and development with particular emphasis on malnutrition, genetic obesity and nutrition in pregnancy. Finally, Williams provides a short but useful review of renal stone disease, and Lieber reviews the metabolism and metabolic actions of ethanol.

The same group of authors have been recruited to contribute to future volumes and this may introduce some difficulties in producing a wide enough variation in subject matter in future editions. It will be interesting to see whether the publishers and authors can maintain the same high standard to be found in this volume.

The book should appeal to a wide audience which should include biochemists concerned with human disease and teaching medical students, as well as endocrinologists and physicians with interests in metabolic disorders.

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Disorder in crystals

Disorder in Crystals. By N. G. Parsonage and L. A. K. Staveley. Pp. 926. (Oxford University Press/Clarendon: Oxford, 1979.) £28.

IN the hierarchy of matter — gas, liquid, crystal — crystals signify order, pattern; they represent classical discipline as against romantic anarchy. "Damn braces, bless relaxes!" cried that arch-romantic, Blake. The authors of this impressive text might have taken Blake as their mentor; their crystals are for ever relaxing from a state of Roman order into one of Italian disarray; same place, changed ways.

The book is about the various ways in which crystals can lose perfect regularity without ceasing to be crystals: it is a study of local variability superimposed on a basic periodicity. The authors in their Introduction (which neatly summarises the argument of the book) distinguish three types of disorder: disorder of position, orientational disorder and magnetic disorder. These might respectively be exemplified by Cu_3Au, where copper and gold atoms are apt to trespass on each other's appointed lattice sites; NH_4Cl, in which a triad axis of the $(NH_4)^+$ ion can point in different defined directions and the ion itself can execute a click-stop rotation about a triad; and $CsCoCl_3.2H_2O$, containing one-dimensionally ordered antiferromagnetically coupled chains of tilted 'Ising spins'. Any chemist, physicist or metallurgist, however expert he may be in one or other of these very broad categories of disorder, will discover a great variety of parallels to and variants of the particular kind of behaviour he is familiar with. The book is a remarkable achievement of synthesis.

The text begins with a detailed treatment of the thermodynamic and statistical mechanical approaches to phase transformations and degrees of order: it is a mark of the combined rigour and flexibility of the authors that they do not agonise about the propriety of classifying order/disorder transformations as phase transformations. The Ising lattice theory in various dimensions receives a full historical survey, as do the various thermodynamic approaches to the order of transformation; the concept of the λ transformation is frequently cited throughout the book. Even such a technical subtlety as the bond percolation problem (if water be imagined capable of percolating along one type of bond only in a crystal, what proporton of the atoms would be wetted if the crystal were bathed in water?) gets due attention.

There is next a useful chapter on experimental techniques, such as thermochemical measurements, diffraction, NMR, IR and Raman spectroscopy, dielectric permittivity, dispersion and loss measurements, and others. The aim is to explain what kinds of information the various methods can provide, and why; no attempts are made to describe hardware or practical difficulties.

The authors then settle down to particular materials, starting with positional order in alloys. As a metallurgist, the reviewer can confirm that this chapter is reasonably up to date and quite clear in classifying and exemplifying the types of positional order. No attention is devoted here, and little elsewhere in the book, to the kinetics of order–disorder transformations, which is a major topic of current metallurgical concern; and microstructure — for instance, the curious structures resulting from spinodal decomposition — is not considered. Again, some important concepts are not explained but simply used: the notion of 'antiphase domain' is an example. This omission of