

## Structure-property relationships

*Structure-Property Relations.* By R. E. Newnham. (Crystal Chemistry of Non-Metallic Materials, Vol. 2.) Pp. x+234. (Springer: Berlin, Heidelberg and New York, 1975.) DM72; \$31.00.

THIS book essays a formidable task in its purpose of relating material properties and structure, in particular in demonstrating the application of some concepts in crystal chemistry to technologically important materials. The first chapter briefly reviews the principles of symmetry and crystal physics and emphasises the importance of such considerations in determining whether a given property can be developed by a crystalline material with a particular regularity of atomic architecture. In the remaining six chapters properties falling within the general fields of electronic transport, thermal properties and ion transport, ferroelectrics and other ferroic materials, optical materials, magnetic materials and materials with useful mechanical properties are described; in each case an outline of the physical principles on which the property is founded is given together with illustrations of particular structural configurations which promote the mechanisms of electronic and atomic movements responsible for the property.

To sketch in even the essentials of such a broad canvas in so short a volume demands economy of presentation. Newnham's text is compact, at times terse, so that it requires sustained concentration and careful study, even by a reader with some familiarity with the contents; this effort, however, often has its reward in an increased insight into a particular phenomenon. Inevitably, too, there must be occasions when the brevity demands simplistic statements which would be qualified in fuller and more rigorous accounts. These shortcomings are overcome by the references to other books and original papers which supplement each chapter and which must be accepted by a reader as an essential part of the presentation.

To assess the value of any book critically one should have a clear concept both of its objectives and the readership to whom it is directed, and it is on this latter aspect that doubts persist: the author's own preface provides no real clue, though perhaps there will be clarification when Volume 1 of the same series is published later. This book cannot be regarded as any kind of course text, though lecturers may find some parts stimulating when preparing their own course

presentation. To describe it as a review is probably misleading in that the limited coverage of any given topic requires that a practising scientist must go on to broader and deeper considerations. Its appeal is greatest if it is judged as some kind of hybrid between an advanced course text and a strict scientific review. In this light it could have a value on the library shelf for both inexperienced and experienced graduates, with sufficient background familiarity in materials studies, wishing to enter a new, unknown area of structure-property relations; but it must be emphasised most firmly that the character of presentation assumes a wide general knowledge of crystalline matter possessed by many materials scientists but certainly not by others, such as conventional engineers. Professor Newnham has made an honourable attempt to solve a difficult problem, but it may well be that a much more expanded treatment is essential; certainly it is a remedy that one is hesitant to recommend with the soaring costs of book production, already apparent in the price of this slim volume.

Peter Gay

## Genetic combination

*Genetic Structure and Function.* By P. F. Smith-Keary. Pp. xvi+368. (Macmillan: London and Basingstoke, March 1975; distributed in the US and Canada by Halsted Press.) Boards, £7.95; paper, £3.95.

*Genetic Structure and Function* represents an attempt to encompass within a single volume an account of genetics at the molecular level, extending from classical genetic analysis to molecular biology. As the author observes in his preface, there are many books of general genetics, but they are all orientated towards the Mendelian approach, and the books on molecular genetics in general tend to start from a more biochemical position. This book is intended "to achieve a better balance between the genetic and the biochemical evidence".

After a brief introductory chapter, the next three chapters deal with the nature of the genetic material as nucleic acid, the structures of bacterial and viral genomes, and eucaryotic chromosomes. It is a straightforward account, the only deficiency of which is a failure to progress to the organisation of eucaryotic chromatin in terms of its components (such discussion is limited to a page).

The next group of chapters essentially concerns traditional genetic analysis in eucaryotes, fungi, and

bacteria and bacteriophages. The first of those chapters develops the principles of genetic mapping, a concern which is taken up in detail for each system in the succeeding chapters. This discussion is competently written if somewhat unexciting in view of the subject matter.

The remaining half of the book is devoted to what might be described as molecular biology, with chapters on the nature of mutation, the relationship between genes and proteins, the genetic code, transcription and translation and their control; a chapter on recombination is the only part of this which relates directly to the earlier material. This again is a well written and clear account, although necessarily of some brevity.

The final two chapters cover a variety of topics: suppression of mutations in bacteria, position effects in maize and *Drosophila*, gene expression in differentiation. These are the weakest; and the last chapter, given the broad title "Genetic Organization and Function in Eucaryotes", provides so condensed an account of its subject that it is difficult to believe readers will gain much from it. Discussion of the components of eucaryotic chromosomes and of the processes of transcription are perfunctory to say the least.

In view of the author's stated aim to provide a more balanced account of molecular genetics, perhaps it is surprising that the book commences with molecular descriptions, and then passes through classical genetic analysis to deal with molecular biology; a more logical development might have been to progress from a starting point of Mendelian genetics. As an introductory account, however, this book has much to commend it: it provides a complete discussion of all topics pertinent to procaryotic molecular genetics, in spite of its broad scope it is accurate and rarely oversimplified, it is well written and easy to follow, and the bibliography is sensible.

Dr Smith-Keary suggests that this book will be useful to second and third year undergraduates (in British terms): but one may feel that a more detailed account will usually be required by the third year. Indeed, given that molecular genetics is a subject of some sophistication, usually approached only after some knowledge of classical genetics has been attained, it is not surprising that separate books are usually written on classical and molecular genetics. The weaknesses of this book clearly are imposed by the attempt to provide a complete account covering such a breadth of material; one wonders if students would not in fact benefit from the more extended discussion possible when more than one book is used.

Benjamin Lewin