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Book Reviews

Bioelectronics by Stephen Bone and Bogumil Zaba; Wiley; Chicester, 1992; vi + 152 pages; £17.50, $37.25. ISBN 0-47-193296-5.

The aim of this book is to present an account of electronics in biology in parallel with the views and knowledge of electronics which has been generated by physicists using inorganic materials. This is a very reasonable approach and it allows the authors to describe features of charge movement in biology in terms of simple circuit diagrams used in man-made electronic equipment. The components of such circuits are the current carriers, the charge conducting and storing media, and the insulators. In the conventional approach to man's circuits the properties of the components are usually described in terms of bulk concepts, such as continuous conduction paths, charge mobility and dielectric constant. Man-made materials are usually homogeneous so that these bulk concepts are relatively readily carried down from the crystal to the molecular level. For example there is the breakdown of the bulk dielectric constant into molecular dipolar and polarizability terms. This approach meets one formidable barrier when carried over into biological systems. Biological circuitry is made of very inhomogeneous constructs, even down to the constituent monomers within the polymers, e.g. to the level of the amino acids in the proteins. We are not obviously able to transfer bulk measurement of the materials to a desired description at the molecular level. In effect the authors find themselves describing systems at the level of bulk properties in parts of the book, while in other parts they must use the statistical mechanics of motion in complex matrices. While making a firm connection between these approaches is very difficult the descriptive one given here is definitely useful since it helps to bridge the gap between two approaches which is so obviously present in biophysical treatments. In conclusion this is an interesting attempt to bring together, at a relatively easy level, the approach of an electronic engineer and a biochemist. The price of the book is within the range of the affordable by a graduate interested in the charge-carrying properties of biological materials.

R.J.P. Williams

New Era of Bioenergetics; Edited by Y. Mukohata; Academic Press; San Diego, 1991; xi + 308 pages; $59.95. ISBN 0-12-509854-5.

The Japanese Bioenergetics Group, founded in 1974, has been exceedingly successful. It now represents more than a hundred active research groups, and sponsors domestic and international meetings. Perhaps most significantly, it acts as a conduit for the management of substantial funds provided by the Japanese Ministry of Education, Science and Culture for integrated programmes of research. One such programme, on four priority areas of Bioenergetics, was completed in 1989. These areas were cation pumps, redox chains, ATP synthesis and extremophiles. The Ministry then provided funds for the editing and publication of the outcomes of the project. The present Volume is the result. Hence it is not, as it might seem at first sight, 'another set of conference proceedings', but rather a carefully distilled summary of progress reports. Although presented as ten chapters by 'senior authors', it does incorporate results provided by the thirty other participants in the research programme, and so is a comprehensive snapshot of the status of Bioenergetics in Japan in 1990. Since Japan has become a leader in most of the topics covered, that means that although now inevitably a little dated, this is a valuable source book for anyone involved in the field.

Not surprisingly, in view of the history of bioenergetics in Japan, the majority of the book is taken up with excellent reviews on ATPases of various specificities and sources. Between them, the elegant application of a variety of techniques, particularly of molecular genetics, led to a concerted view of mechanisms of energy transduction in general and of the molecular dynamics of ion pumps in particular. This major section then bridges to electron transfer in an extremophile via a valuable synopsis of the rapidly emerging 'sodium world' of Bioenergetics. The last two chapters are on human mitochondrial genetics, firstly related to disease and finally to the phylogeny of human populations.

A book that starts with the molecular biology of the Na^+, K^+-ATPase and ends with the history of the dispersal of the Mongoloids may sound a little odd. In fact, as a record of the meticulous application of a common set of techniques, it is remarkably coherent.

Harold Baum

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