

Biological regulation processes

Biological Regulation and Development. Vol. 1: Gene Expression. Edited by R. F. Goldberger. Pp. 558. (Plenum: New York and London, 1979.) £24.88.

THE motivation to produce this inaugural volume of a multi-author treatise on regulation is that it would be productive to approach the subject in a way that cuts across traditional boundaries. The editors aim to avoid bringing together all possible facts relevant to a particular operon, virus or biosynthetic system. For instance, no one person works on suppression *per se*, only on aspects of the phenomenon. The actual chapter by Steege and Söll on suppression successfully picks up the various threads from many different laboratories. This approach, however, means that the same system is often discussed from different points of view by different authors. In a few places this needs some stronger editorial control and cross reference to assist readers with less experience in these areas. Dia-

grams of the same system sometimes appear quite differently in consecutive chapters. The chapter on regulation of DNA replication by Lark suffers from a complete lack of diagrams. In other chapters there is some obvious duplication of material which can be irritating. On balance, however, these problems do not greatly detract from what turns out to be a stimulating set of contributions stressing the essential concepts that underline our knowledge of regulation of gene expression. The book will be of considerable value to senior undergraduates, to postgraduates and to their teachers. Individual chapters deal mainly with regulation in microorganisms but recurrent themes are evolution of regulatory mechanisms and to some extent the relationships between prokaryotes and higher organisms. Later volumes must expand on this latter aspect but perversely no indication is provided, at least in this volume, of future contents.

The initial chapter by Goldberger covers general strategies of genetic regulation and provides a frame of reference for the discussions of operon complexity by Campbell and autogenous regulation by Savageau. Clarke develops the evolution theme with the

view that regulatory systems can be potent agents of evolutionary change. The chapters that follow deal with the relevance of DNA sequence and conformation. Pribnow's chapter on control signals should really be followed by the two more physicochemical contributions from Von Hippel and Sobell on the specificity of DNA-protein interactions and implications of DNA conformation. These latter chapters, careful consideration. Steitz then though speculative in places, deserve stresses the importance of RNA-RNA interactions, especially in ribosome function and proposes that mRNA effectively selects protein molecules that facilitate such interactions. Cortese follows with a review of the various functions of tRNA that are secondary to, or derived from, its primary function as amino acid adaptor. Finally, Maaløe amply demonstrates the stimulating but complex challenge of evaluating the possible interplay of all these various regulatory mechanisms in the growing organism (mainly *E. coli*).

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Thermal neutron scattering

Introduction to the Theory of Thermal Neutron Scattering. By G. L. Squires. Pp. 260. (Cambridge University Press: Cambridge, London, New York and Melbourne, 1978.) £16.

THERMAL neutrons are used widely to study structures and correlations in solids and liquids. They have just the right wavelength for atomic physics; and, as nuclear scattering takes place effectively at a point, one can use the scattered intensity to disentangle the motion of atoms. The momentum transfer dependence of the scattering is the Fourier transform of the spatial structure, and the energy dependence is likewise the Fourier transform of the time dependence of correlations. The magnetic moment of the neutron is a valuable bonus, sensitive to the magnetic structure of materials at the atomic level.

There are several textbooks on the physics which emerges, and on the techniques, but most authors content themselves with rough and ready derivations (or simply quoting) the rather complicated expression for scattering cross sections which are needed for quantitative analysis. This can be hard on research students wanting to extrapolate formulae to fresh situations and

wanting to grasp from first principles the meaning of phonons, magnons, spin waves and correlation functions. Gordon Squires' book fills this gap admirably. As the title implies, the book is aimed at deriving the formulae systematically and rigorously. It is the Goldberger and Watson of thermal neutron physics. Students will appreciate the beautifully precise, lucid and explicit algebra, which follows smoothly from undergraduate quantum mechanics. The material is extraordinarily well organised; there is great care over nomenclature, no mistakes and no missing lines. On the other hand, the casual reader might find the subject a bore, and even the dedicated reader will have to reflect carefully on the objectives of the formulae and the physical implications of each factor or approximation. To help his understanding, there are several problems, many of them quite hard, with solutions. Formulae are illustrated briefly with experimental results, but there is no systematic attempt to explore the physics which emerges from thermal neutron scattering.

This volume will be a valuable prop to the experimenter wanting to be sure of the foundation of his subject.

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