Molecular Biology

The fourth in a series of monographs on microbial and molecular biology, **Control of Macromolecular Synthesis: A Study of DNA, RNA, and Protein Synthesis in Bacteria**, by Ole Maaløe and Niels O. Kjeldgaard (Benjamin, New York, 1966. 296 pp., illus. $12.50), conforms closely to the aims propounded by the editor of the series, Bernard D. Davis, in his foreword: it presents a comprehensive review of a rather narrow topic, specified in its title, and the authors have discussed and reassessed their own contributions to the field. At the present time, however, this narrow topic is of paramount interest to a large number of research workers, and from the studies encompassed by this title have come in recent years many of the advances which make molecular biology the exciting and prolific subject it is. Because of the rapid growth of the subject, the book inevitably contains statements and guesses that the authors might now well wish to revise in the light of new investigations completed since the manuscript was finished in May 1965.

This should not, however, detract from the value of the book, since much of the text consists of carefully argued discussions on quantitatively evaluated data and, although the purpose of the book is to provide graduate students with a basis for further reading of the research literature, the habit of careful evaluation of the available data which the writing of these two scientists conveys very well would be fully as useful an acquisition to a research student as the data the book contains. The authors lucidly describe the aims of the experiments, the experimental limitations imposed by nature or by technology, and the "if's" and the "but's" that must attend the interpretations placed upon the experimental findings.

The structure of the book is unusual. Twenty percent of it consists of an introductory survey of present concepts of the replication and transcription of nucleic acids and the synthesis of proteins in bacteria. This provides a good summary of the experimental observations that gave rise to presently accepted theories and will make informative reading for many people working in the field who may have forgotten the arguments that ranged on this or that concept before the present views were reached.

The major part of the book deals with studies from the Copenhagen laboratory of Maaløe—first on steady states of growth, dealing with cell size, number of nuclei, and quantities of RNA, ribosomes, and proteins; and secondly on transitions between steady states of growth and on deductions concerning the mechanisms of regulation of RNA and DNA synthesis derived from these transition experiments. Finally, the texts of four original papers are included to provide easy access to detailed descriptions of the experimental procedures.

Thus the book provides a summary of the presently accepted theories of protein, DNA and RNA synthesis, and the mechanisms of regulation of genetic expression; an exposition of the studies from the Copenhagen laboratory giving the background to the experiments, the evaluation of the experiments, and a discussion of the conclusions viewed from the authors' present vantage point; and finally a compilation of experimental techniques. One might have wished to read the rejoinders K. Lark could give to the authors' arguments on control of DNA replication; or to read the authors' interpretations and speculations on the mechanisms of control of protein synthesis in the light of the very recent studies on nonsense mutations, initiator codons, and the multiple binding sites for transfer RNA on the ribosomes; or to read what changed interpretations of the mechanisms of control of RNA synthesis could be made in the light of very recent studies on the changing ratio of tRNA to DNA under various conditions of growth. But an author must at some time call a halt to the stop-press items he can incorporate into his manuscript, and the book which these authors have produced will be, for some years to come, essential reading for graduate students in molecular biology and microbiology, and will inform and stimulate many active workers in these fields as well.

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Questions about Vectors

Vectors are studied in two ways—as elements of abstract vector spaces or as elements of the vector fields of applied mathematics. Banesh Hoffman, in **About Vectors** (Prentice-Hall, Englewood Cliffs, N.J., 1966. 144 pp., illus. Paper, $4.35), takes the second of these approaches. Vectors are tentatively defined as entities with direction and magnitude and obeying the parallelogram law of addition. During the course of the text the standard operations are introduced after a thorough motivation. The purpose of the book as stated in the preface is "as much to disturb and annoy as to instruct. . . . It is intended as a supplement and corrective to textbooks. . . ." Specifically, Hoffman calls our attention to awkward questions concerning, for example, free and bound vectors. Some readers will be disappointed that he provides no final resolution to many questions he raises, while others will enjoy the opportunity to clarify their ideas on these matters in their own way. Occasionally Hoffman appears to mystify for no good reason. He observes (p. 32) that forces at different points of a field cannot be added, whereas any pair of vectors in an abstract space can. But this restriction is not found only in vector calculus; any two real numbers can be added, but when calculating values for the sum of functions $f(x)$ and $g(x)$, one does not add $f(2)$ to $g(3)$.

Some features of the book deserve favorable mention. No calculus is used, which makes the book accessible to a wide class of readers. Exercises are scattered liberally through the text and form an integral part. A very interesting section describes vectors which are first associated with surface areas but are found to be more directly related to their rims. On the other hand, it is disappointing that the culminating chapter on tensors contains no examples other than the metrical tensor, although the author is careful to give many applications of vectors in the form of displacements, velocities, forces, and moments.

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