

Despite these minor shortcomings the book will be a welcome help to many of those "backroom boys" whose task of evaluating alternative investment possibilities almost always presents difficulties.

A personal view should be added on the question of footnotes. It is very irritating if footnotes are given at the end of each chapter; in my view footnotes belong at the foot of the page, and I wish the publishers would try to look up, for example, the sixteen footnotes to Chapter 1 of this book, searching sixteen times for the place where the notes have been hidden!

G. F. RAY

## MOLECULAR BIOLOGY—1964

### Molecular Architecture in Cell Physiology

Edited by Teru Hayashi and Andrew G. Szent-Györgyi. (A Symposium held under the auspices of the Society of General Physiologists at its annual meeting at the Marine Biological Lab., Woods Hole, Mass., Sept. 8–11, 1964.) Pp. viii+252. (Englewood Cliffs, N.J., and London: Prentice-Hall, 1966.) 60s.

THE eleven papers in this book range widely both in content and in quality. All are concerned with crucial problems of molecular biology, but several do not impinge at all closely on any of the other papers. Two are excellent—Van Holde's account of his work on the quaternary structure of haemocyanins and Carolyn Cohen's article on the  $\alpha$ -class of fibrous proteins. Shapiro's article on nucleotide sequences in DNA is less satisfactory. Although he reports some interesting new work on the antipolarity of the two strands of DNA, most of his article is an uncritical account of older work on pyrimidine nucleotide sequences involving the partial hydrolysis of DNA by hot dilute sulphuric acid. Unfortunately there is no evidence published that the required stage of hydrolysis can be reached by this method without unwanted side reactions. In any case, a better method for quantitatively liberating the sequences of pyrimidine nucleotides from DNA has long been available.

There is only the space to mention the other articles very briefly. From a physico-chemical point of view, Katchalsky, Oplatka and Litan analyse mechano-chemical equilibria of collagen fibres and hysteresis effects in polynucleotides. Conformations of small molecules are briefly discussed by E. B. Wilson and the folding of polypeptide chains is considered by Scheraga. McElroy and Seliger describe their work on bioluminescence and point out that the species differences in the colours of the emitted light appear to be due to the structures of the luciferase proteins. Edelman reviews the structure of antibodies and the implications for the mechanism of antibody formation. Other papers are on the structure of amino-acid transfer RNA (Cantoni), the design and assembly of organized structures (Caspar) and the arrangement of DNA in sperm (Inoué and Sato).

The volume has been well produced, but it was not received for review until more than two years after the actual meeting. As a result, much of the original impact has now been lost, particularly in the article on amino-acid transfer RNA, which was written before the primary sequence of any nucleic acid had been determined.

K. BURTON

## RECIPES FOR CHROMOSOMES

### Chromosome Techniques

Theory and Practice. By Arun Kumar Sharma and Archana Sharma. Pp. x+474+41 plates. (London: Butterworth and Co. (Publishers), Ltd., 1965.) 87s. 6d.

THIS book deals with the methods used to study chromosomes in plant and animal cells. Although their theoretical

background is described, the reader will find little about the chromosomes themselves. The authors are skilled cytologists who have done valuable work on the chromosomes of plant cells using classical methods of cytology. The book reflects their experience.

After a brief introduction in which the authors present their views on the structure of chromosomes, the book deals in turn with the four essential steps in the study of the physical nature of chromosomes—pre-treatment, fixation, processing and staining. The advantages and disadvantages of pretreatment with colchicine, acenaphthene, chloralhydrate and many other chemicals are described, and there is a discussion of the possible modes of action of these materials. The composition of more than sixty fixing chemicals is next described, with the emphasis on the mixtures which most effectively preserve the structures of chromosomes. The presentation of techniques of processing—block preparation and microtomy of smear preparations—is extremely detailed, and might be useful for beginners.

The next chapter deals with stains and staining; it includes a good description of the Feulgen reaction but, unfortunately, the bibliography virtually ends in 1960. More recent papers such as those of Sandritter, which show the advantages of milder conditions of hydrolysis in the Feulgen reaction, are omitted.

The book includes a chapter on the methods used for studying certain special problems of chromosome structure such as uncoiling chromosomes, the demonstration of the centromere and secondary constriction, heterochromatin in plant cells, salivary gland chromosomes (although the name of Beerman is missing), lampbrush chromosomes, and pollen grains. There follows a disappointing chapter on special methods such as autoradiography, electron microscopy, and fluorescence microscopy. Here again, unfortunately, the bibliography is not up to date. Only 12 per cent of the papers quoted were published after 1960 and the appendix does not contain much recent information, while names like those of Caspersson, Claude, Palade and Bertalanffy are not there. This first part of the book, devoted to the physical as distinct from the chemical structure of chromosomes, finishes with chapters on chromosomes in tissue culture cells, cancer chromosomes and the effects of the physical and chemical agents which produce metaphase arrest, polyploidy, and chromosome breakage.

The introduction to the second part of the book is a brief outline of current ideas on the chemical constituents of the chromosomes. Conspicuous weaknesses include the absence of the names of Avery and Gulland, the constant mis-spelling of the name of Miescher, and the fact that the Watson-Crick model is considered a "recent suggestion". The chapters which follow describe cytochemical methods for detecting nucleic acids, a few biochemical methods for their estimation, and classical techniques for the cytochemical detection of amino-acids and enzymes. The last chapter deals with the extraction of nucleic acids and the isolation of nuclei.

Another section of the book consists of a series of plates consisting of photographs of chromosomes, mostly from plant cells. The absence of salivary gland chromosomes from Dipteran larvae is unfortunate. The reproduction of the photographs is satisfactory.

As can be inferred from this analysis, the chief failing of this otherwise valuable book lies in the absence of recent bibliography. No more than forty of the 1,200 papers quoted were published after 1963. I have the impression, which seems to be confirmed by the preface, that the authors began writing their book with enthusiasm but found some difficulty in finishing the job. Although there are a number of minor errors the book can be recommended as a useful guide for intelligent technicians, advanced students and new investigators in cytology.

J. BRACHET