between laboratories, and variations in scoring procedures as being problems needing attention.

In general the volume is a well-produced and useful review of the present state of knowledge in this complex field. The editors, organizers, and publishers are to be congratulated on the production of such a useful volume at a reasonable price, with a relatively short time lapse between the conference and the publication of the papers.

JOHN L. HAMERTON

The Chromosome. Structural and Functional Aspects. A Symposium, Miami, 1965. Organized by Dr. George Yerganian. (Publication of the Tissue Culture Association. Vol. 1. Annual Symposium June 1-4, 1965). (Pp. xiii + 107; illustrated. 68s.) Edinburgh: E. & S. Livingstone. 1965.

This book contains the original papers contributed by chromosome cytologists and biochemists at a symposium held in Miami, June 1965. The topics range from the cytogenetic mechanisms and evolution of mammals, techniques for the automated analysis of the morphology of metaphase chromosomes, the molecular structure of chromosomes from evidence derived from electron microscopy, the action of viruses and specific antimetabolites, estimates of the metabolic turnover of nuclear proteins, to mechanisms of derepression and repression of RNA transcription and their relation to the structure of hetero and euchromatin.

R. Mathey uses chromosome diversity within and between populations of the African pygmy mouse to demonstrate the ways in which chromosome changes of the Robertsonian type and differences in the sex chromosome mechanism can result in isolation barriers and hence give the possibility for sympatric speciation. He examines these mechanisms in the sympatric species *Mus minutoides minutoides* and *Mus minutoides indutus*, and finds that the species represent the terminal homozygotes of an 18/36 Robertsonian system and have different sex chromosome mechanisms. *M.m. indutus* ($2n = 36$) has a normal XY sex chromosome complement and *M.m. minutoides* ($2n = 18$) a presumptive X/autosome - Y/autosome translocation sex chromosome complement. A fact which emerges from this most interesting study is that the morphological criteria for distinguishing the two taxa are confined to molar characters and this together with the cytological situation suggests that these mice are probably still passing through a stage of active speciation.

G. Rudkin and F. Ruddle *et al.* present papers on the measurement of metaphase mammalian chromosomes to assess mass and length using automated photometric and photographic techniques, respectively. Rudkin outlines the limitations in measuring small objects of the order of 2 to 10μ using a light microscope and correctly points out that photometric measurements of whole chromosomes are not as susceptible to errors introduced by the resolving power of the optical system used as are length measurements. Ruddle *et al.* go to great lengths to show that their Fidac system of scanning film nega-

tives of metaphase plates is nearly as accurate as manual analysis of bromide prints made from the same negative. This may be so, but it seems to this reviewer more probable that direct photometric techniques, which do not involve intermediate photographic stages and their associated inaccuracies, will in time be more profitable for the automated analysis of chromosomes.

Papers by N. Swift, M. Cohen *et al.*, and T. Hsu *et al.* are concerned with elucidating the molecular structure of chromosomes from different experimental approaches. Swift summarizes the arguments for the one-stranded and multistranded concepts of chromosome structure and principally supports the single strand hypothesis. He suggests that a model of the chromosome in which a series of lateral loops are placed along an axial strand would fit the majority of experimental evidence including the electron microscopic data taken from polytene and lampbrush chromosomes. Cohen *et al.* review literature on the apparent localization of chromosome breakage by viruses and antimetabolites and emphasize the importance of standardized procedures while experimenting in this field. They list the precautions taken to ensure objectivity during experiments in their own laboratory, a list which experimentalists in any field could profitably read. Hsu *et al.* investigate the effect of actinomycin D on chromosomes and conclude that the reagent preferentially attacks the chromatin at sites of RNA transcription.

D. Prescott *et al.* give the results of their investigation on the rate of turnover of tritiated amino acids in proteins, and conclude that there is a complete turnover of chromosomal protein within three cycles.

The excellent paper by J. Frenster on repression and derepression of RNA transcription is sufficient justification in itself for acquiring this book. Frenster succinctly reviews the relevant literature and describes the results of some of his own experiments in which he uses isolated nuclei from calf thymus lymphocytes. Heterochromatin and euchromatin fractions are separated from the nuclei and subjected to chemical and physical analyses. The effects of polyanions, enzymes, and RNA on the rate of RNA transcription in the two types of chromatin are described and discussed. The paper is a significant contribution in a part of chromosome biochemistry which has hitherto appeared confusing to many people. It successfully draws together evidence from many different sources and presents it and the conclusions in a most readable manner.

P. L. PEARSON

Protein Biosynthesis and Problems of Heredity, Development, and Ageing. By Zhores A. Medvedev. Translated from the Russian by Ann Synge. (Pp. xxi + 584; 68 figures + 18 tables. 110s.) Edinburgh and London: Oliver and Boyd. 1966.

All organisms take amino acids and combine them in highly specific sequences to form proteins. The study of the imposition of order by an organism on its environment is what biology is about, and protein

biosynthesis is central to biology; not only are structural proteins the building blocks for growth and enzymes the key to function, but also the specificity of structure of each protein and of the nucleic acids concerned in its synthesis is the basis of reproduction.

This is a most important book on this central theme. Dr. Medveder has not tried to cover the same ground as the numerous monographs and reviews on molecular biology, but has taken a fresh look at the problem and kept to the subject of this title. Throughout the author has avoided stressing historical or over-familiar aspects but has given critical accounts of the experimental work on which our present knowledge is based and of the theoretical implications of the results.

Some idea of the scope of this book is given by chapter headings: mechanism of activation of amino acids (III), selective transfer of activated amino acids (IV), the role of organelles (V), formation of antibodies (XI), morphogenetic changes—the genetic programme of development (XVIII), the problem of ageing at the molecular level (XIX). Particularly valuable is a supplementary chapter (XX) for the English edition dealing with important advances during 1963 and 1964 (the Russian edition appeared in 1962). Each chapter has a concluding section summing up the contents, and there is a very useful 'General Conclusion' at the end of each of the four parts into which the book is divided. A full bibliography appears at the end of each chapter.

The chapters are subdivided into sections, each with its own subheading, but the subject matter of each section and chapter leads so logically into the next that this arrangement helps the reader to go smoothly through from start to finish. This organization of the book is one of its most valuable features, contributing greatly to its readability and lucidity. Both author and translator are to be congratulated on this and on the clarity of the text; minor criticisms are the somewhat excessive use of inverted commas and the choice of 'matrix' instead of the more familiar 'template'. The absence of a subject index is unimportant in a book of this type; the logical arrangement of the text and the very complete list of contents make an index unnecessary.

This book should be required reading for every candidate for honours in biochemistry, genetics, or microbiology. Any student of biology or medicine who wished to understand modern biochemical genetics would be well advised to read it.

L. I. WOOLF

covered 35 cases, the youngest being 7 days old and the oldest 60 years. A detailed clinical analysis brings out that frequently there are associated mental retardation and impaired hearing, while the histological studies established malformations of the neuroepithelium of the retina, the optic tracts, and cerebral cortex. Inheritance was in a recessive sex-linked manner.

The recognition of this disorder has proceeded in a peculiarly halting manner for some 50 years. It is likely that the first case record goes back to Ernest Clarke in 1898. The pedigree of hereditary microphthalmia published by Ash and his associates in 1922, and subsequently elaborated by J. A. Fraser Roberts in 1937, by Iles in 1939, and by Whitnall and Norman in 1940, clearly established sex-linked congenital blindness associated with mental deficiency; these authors stressed the microphthalmia rather than the underlying 'pseudoglioma'. R. Wilson of London in recording another family in 1936 stressed the pseudoglioma aspect. Abroad, Heine, in 1925, invoked intrauterine inflammation to explain pseudoglioma in two brothers whose maternal uncle was blind, deaf, and mentally abnormal, while Norrie stressed, in 1927 and 1933, the occurrence of a congenital hereditary form of blindness in males in three families. It is possible that a brief account by Fernandez in 1905 on two brothers in Cuba is yet another early report of this affection. The disorder finally came to be fully recognized as a clinical entity—sex-linked pseudoglioma—by W. M. G. Wilson in 1949 who published a particularly convincing Canadian pedigree of an unaffected woman who had two affected brothers and affected sons by three different men.

This monograph reviews fully the available literature which includes a number of recent reports. There is also a full discussion of allied conditions. Pseudoglioma and microphthalmos, the two aspects stressed in the earlier reports, are now regarded as secondary to non-attachment of the opposing layers of the invaginated optic cup. The designation of Norrie's disease was first applied by Andersen and Warburg in 1961, and more recent German literature speaks of Heine-Norrie disease, but it seems that any eponymous designation is questionable, particularly when the name sex-linked pseudoglioma is both more informative and less debatable.

ARNOLD SORSBY

Introduction to Animal Physiology and Physiological Genetics. By E. M. Pantelouris. International Series of Monographs in Pure and Applied Biology/Zoology Division/Volume 32. (Pp. viii + 497; 172 figures + 50 tables. 75s.) Oxford: Pergamon Press. 1967.

Medical practitioners and human geneticists will enjoy the author's broadly zoological approach to physiology. The book is arranged in four sections: response mechanisms, nutrition and energy-yielding processes, regulation

Norrie's Disease. A Congenital Progressive Oculo-acoustico-cerebral Degeneration. By Mette Warburg. *Acta Ophthalmologica: Supplementum* 89. (Pp. 147; illustrated. Dan. kr. 65.) Copenhagen: Ejnar Munksgaard. 1967.

This excellent monograph is based on an exhaustive study of 6 families showing congenital sex-linked pseudoglioma: 3 from Denmark and 3 from Sweden. They