Book Reviews

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Biomathematics. Volume 1. *Mathematical Topics in Population Genetics*. Edited by Ken-ichi Kojima. (Pp. vi+400; 55 figures and tables. $18·70.) Berlin, Heidelberg, New York: Springer. 1970.

This book, after a curious introduction, in which the work of various distinguished non-authors is mentioned, starts well with a chapter by Wright, who expounds with conciseness and lucidity his views on drift, or rather on drifts with complex interactions, and on adaptive surfaces. The mathematics may, as his critics have pointed out, be circular, and adaptive surfaces may be useful aids to historical reconstruction, rather than recipes for struggling incipient species. Whether one can climb an imaginary surface, or get trapped in an imaginary potential well, seems a minor point, for mathematicians must be seen as painters rather than photographers or engineers, and certainly some readers will be helped in their attempts at understanding. The chapter is also a useful introduction to Wright's recent volumes, and has the advantages, and disadvantages, that the numerical treatment is mainly simple, and obtrudes less on the grand sweep of his prose.

The second paper, by J. R. G. Turner, challenges Fisher's fundamental theorem not because it is too fundamental, or tautologous, but because its author reached his conclusions 'erroneously by a certain lack of mathematical rigour'. Turner's provision of additional qualifying words to Fisher's definition hardly helps in the search for bedrock and rigour. To criticize Fisher's claim that fitness resembles entropy, on the ground that his concept of fitness is hazy, seems strange, for entropy could well be criticized on the same grounds. The chapter is difficult, like its subject, and any judgement on it even more difficult.

Diffusion is treated thoroughly in chapters on dispersal by Richardson and on stochastic process by Kimura, the former acting as a useful introduction and the latter as a definitive review of Neutrality by the leading Neutralist. These chapters are separated by a definitive review, on loads, by Crow, with a supplement on costs, which achieves the difficult task of being self-sufficient as an introduction to both and also by Cockerham's recursive formulation of the inbreeding problem. Hill and Robertson, in separate chapters, review and extend their own work on phenotypic selection, Robertson discussing in detail his empirical study by Monte Carlo methods of the influence of linkage on the speed and extent of selection with several loci and variable intensities of recombination.

Sved and Mayo discuss and review Fisher's theory on the evolution of dominance, which they study by both exact and approximate methods and by simulation studies.

There is a chapter on the application of branching process theory to genetics, by Schaffer; and a chapter on incomplete binomials by Li, now a problem of mainly historical interest in an era of small families and advanced biochemistry. The book ends with short chapters on the evolutionary significance of linkage and epistasis by Kojima and Lewontin and on fitness and optimization by Levins.

Dr Kojima, who was killed in a road accident last year, has created a most valuable selection of articles, mostly in the form of reviews with recent additions and a sufficient lucidity to act also as introductions.

The book can be recommended highly for University libraries and departments of genetics. Many papers are dedicated to Dobzhansky for his seventieth birthday. As a whole the book is a fitting memorial to the enthusiasm and catholicism of its editor.

J. H. EDWARDS

Comparative Genetics in Monkeys, Apes and Man. Edited by A. B. Chiarelli. Proceedings of a Symposium on Comparative Genetics in Primates and Human Heredity held at Ernice, Sicily, July 1970. (Pp. x+346; figures and tables. £5·50; U.S. $16·50.) London and New York: Academic Press. 1971.

This book is based on a conference held in Sicily in July, 1970. The topics covered included epigenetic polymorphism of the primate skeleton, blood groups, leucocyte antigens, and haemoglobin of non-human primates, phylogeny of immunoglobins in the primates, evolving primate genes and proteins, and comparative cytogenetics in primates.

It is the two last topics that throw most light on primate evolution. Goodman and his colleagues show how immunological resemblances measured by Ouchterlony plate comparison, haemoglobin, cytochrome C, and fibrinopeptide A resemblance in amino-acid sequences and DNA hybridization experiments give on the whole a consistent picture. All three methods place man, chimpanzee, and gorilla in one close group, with orang-outang some way away and the gibbons almost as far away as the old world monkeys. Comparison with palaeontological evidence indicates that the rate of nucleotide change has slowed down by absolute time in the primate line leading to man, though it may have been fairly constant in terms of generation time.

The comparison of karyotypes by Chiarelli again shows the close resemblance of man, chimpanzee, and

gorilla. Chiarelli was writing soon after fluorescence and banding of chromosomes was discovered. On morphological grounds and from replication patterns he suggests that the human chromosome 1 corresponds to a Robertsonian translocation of the chimpanzee 15 and 13. This has presumably already been confirmed or contradicted with the new techniques.

C. O. CARTER

Progress in Medical Genetics, Vol. 8. Edited by A. G. Steinberg and A. G. Bearn. (Pp. vii+319; figures and tables. £9·00.) London: William Heinemann. 1972.

As presenting up-to-date authoritative reviews of various aspects of medical genetics this series has clearly established itself. This new volume covers a number of widely differing disciplines. Fenner deals with genetic aspects of viral diseases of animals. At first sight this might not seem of particular relevance to medical geneticists. However the unravelling of the genetic constitution of animal viruses is an enthralling story which will encourage those who hope that one day a similar level of sophistication may be attained in higher organisms, including man.

German considers in detail the relationship between chromosomal rearrangements and cancer. Put simply the argument runs as follows. Many human cancers have one or more demonstrable marker chromosomes derived from normal chromosomes by breakage and rearrangement. There are essentially two different ways in which such marker chromosomes might arise. Firstly the particular cell which first underwent conversion to a cancerous cell and became the progenitor of all the cells of the cancer itself contained the mutated chromosome. Alternatively the chromosome rearrangement might arise in one of the descendants of the first cell to undergo neoplastic change which had a normal karyotype. German argues that evidence from patients with certain Mendelian disorders associated with an increased risk of cancer (such as Bloom's syndrome, Fanconi's anaemia, Louis-Bar syndrome, and xeroderma pigmentosum) tends to favour the former explanation, ie, that chromosomal rearrangements occur in the cell which originally becomes neoplastic. However it is probable that such chromosomal rearrangements may have little to do directly with cancer other than to provide a predisposing background.

Morton writes eloquently, though to a medical practitioner perhaps not entirely convincingly, on the future of human population genetics. Kirkman's chapter on enzyme defects is a very clear and comprehensive review. Mechanisms of enzymic deficiencies, detection of heterozygotes, and treatment of enzyme defects are discussed. A particularly intriguing problem for the human biochemical geneticist is the molecular mechanism of dominant disorders other than the haemoglobinopathies. Apart from angioneurotic oedema in which there is a deficiency of an inhibitor of C'1 esterase, a deficiency of a specific protein has so far not been demonstrated in any autosomal dominant disorder. Kirkman discuss several possibilities for the molecular basis of such disorders, including defect in a rate-limiting enzyme, mutant gene producing an abnormal protein with deleterious effect or altered substrate specificity, or a mutant gene resulting in excessive enzymic activity.

Clarke discusses in detail the whole problem of the prevention of Rh isoimmunization which he and his colleagues in Liverpool have pioneered. It is gratifying to learn that there are virtually no risks in giving anti-D as a prophylaxis even if given again in a subsequent pregnancy. Yet another area pioneered by the author is the subject of disorders of ganglioside metabolism reviewed by Brady. Not only are chemical methods now available for establishing the diagnosis in affected individuals (and detecting heterozygotes in some instances), but also for the antenatal diagnosis of these disorders. Finally there is a very comprehensive review of the genetics of short stature by Scott. It is gratifying to realise that by clinical and radiographic studies much of the heterogeneity within this group of diseases is being clarified, an essential step for giving reliable genetic counselling.

As with previous volumes in this series, this one can also be highly recommended to all interested in developments in medical genetics.

ALAN E. H. EMERY

The Role of Genetics in Mental Retardation. Edited by Robert M. Allen, Arnold D. Cortazzo, and Richard P. Toister. (Pp. 115; illustrated. $6.95.) Miami, Florida: University of Miami Press. 1972.

This book contains the three papers read at a symposium held at Sunland Training Centre at Miami, Florida. An opening statement by Arnold Cortazzo precedes the papers, which are followed by three brief closing statements.

A problem for speakers at a symposium of this kind is to judge the level of understanding of those whom he has to address and to set his standard and style accordingly. This symposium was sponsored by the South Florida Foundation for Retarded Children, the Sunland Training Centre, and the Hospital Improvement Program and no doubt there would be a mixed lay and professional audience of parents, social workers, psychologists, doctors, and others.

The opening statement by Arnold Cortazzo is clearly intended to soften up the audience for what is to follow and is aimed at those with little or no scientific knowledge. It describes the cell and cell division with a brief explanation of genes, Mendel's laws, and the molecular structure of genes. Too much is attempted in too small a space (about 10 pages of text). It would have been better without any mention of the 'DNA staircase', code letters, messenger RNA, and so on; none of which is necessary for an understanding of what follows. The account of the reduction division is a little confusing.

Dr Smith talks about the clinical aspects of genetics in mental retardation and, of the three chapters, this is the