

to use such a cyclical system, the inbreeder must compare the increase of efficiency achieved for the marked segment with the reduction in efficiency for the remainder of the chromosomes. Fisher shows how this can be done with precision.

Enough has been said to show how valuable a book *The Theory of Inbreeding* is. Geneticists may complain that it is not easy reading. Yet to those possessed of persistence and a little mathematical accomplishment, the difficulties will smooth themselves out. Indeed, chapter III is an introduction to matrix algebra, and its genetical uses, which at least some of us would have found useful on many occasions in the past. And whatever trouble the reader must take in following the mathematical methods used, he will be amply repaid not only by the insight he gains into the ramifications of inbreeding but also by the increased confidence and precision which he can bring to the practical problems of designing and carrying out inbreeding programmes, whatever his aim in their use and whatever the vagaries of the species with which he may be concerned.

K. MATHER.

THE BIOLOGY OF MENTAL DEFECT. By Lionel S. Penrose. Sidgwick and Jackson, 1949. Pp. xiv+285. 21s. Preface by Professor J. B. S. Haldane.

The perennial problem of mental deficiency may be approached from the point of view of a variety of special studies, such as medicine, genetics, psychiatry, law or sociology. From any one of these angles an exhaustive treatment could be undertaken. The successes of specialists in their own fields have sometimes given rise to an unjustifiable optimism about the final solution of the problem. Early and accurate diagnosis, hormone therapy, shock treatment, psychological training, legal protection for both the defective and the society he lives in, and positive and negative eugenics, all have their contributions to make. A synoptic survey of the whole field shows that the problem is much more complex than was originally suspected, but the ultimate alleviation, cure and prevention of mental deficiency on a considerable scale will no doubt be achieved by a synthesis of many different methods and researches.

In his earlier book, *Mental Defect*, Professor Penrose described the subject as providing great opportunities for research, especially in the fields of genetics, medicine and sociology. Advances made in the fifteen years which have elapsed since then now warrant a much more integrated treatment. The ramifications of the subject are enormous, and "to limit the task here, medical and psychopathological conditions encountered in mental deficiency practice are discussed chiefly within a framework of genetics". The aim of the book is to present the problem of mental deficiency from the broader aspect of human biology so that its study can be more readily related to the remainder of sociology and medicine.

Penrose commences with a general historical survey and then goes on to consider the incidence, definition and measurement of mental deficiency. This is followed by a chapter on the principles of classification. Next, there is a discussion of the rival claims of nature and nurture to be the causative agents of mental defect. The subsequent five chapters are especially concerned with the genetical aspects of the problem, dealing with dominant, recessive and sex-linked defects; the genetics of intelligence and its relation to differential fertility; and methods of analysis in human

genetics. There is a chapter devoted to mental disorders, as distinct from mental defects, and a final chapter on treatment.

In treating so vast a subject as mental deficiency it is of course impossible to give full weight to every aspect and a considerable selection of topics for discussion is inevitable. However, there are a few notable omissions which should be mentioned. For example, the section on "Linkage" in the chapter entitled "Methods of Analysis in Human Genetics" makes no mention of the important method of *u*-statistics first developed by R. A. Fisher in 1935 and later greatly extended by D. J. Finney from 1940 onwards. Appendix 9 does give Penrose's sib-pair test but this is less efficient than using the appropriate *u*-statistic. Again, in the same chapter, the section on "Mendelian Ratios" fails to emphasise the importance of the method of ascertainment, and does not even explicitly mention and distinguish the Proband and Sib methods.

Another criticism which must be made is that much of the statistical data in the book is presented in such a way that it is difficult or impossible to decide what conclusions can be drawn. For instance, on page 117 there is a table giving the correlation coefficients of the I.Q.s of pairs of sibs and parents as measured at different times by various authors. No standard errors or sample sizes are shown and one cannot tell whether apparent discrepancies are significant or not. On page 196 there is a discussion of the view that birth injury is more likely at first delivery than in later deliveries. While this view may be correct the evidence given is not adequate to support the theory. Knowledge of the proportion of birth injuries resulting from first pregnancies is not enough: we must also know the proportion of uninjured first births. Again, on page 216, fifteen cases, in which there is parental syphilis as well as juvenile general paresis in the child, are classified in a four-fold table according to the sex of the child and parent. Penrose says "there seems also to be a relative excess of father-son and mother-daughter pairs". But no statistical appreciation is made. In fact, the exact treatment of the four-fold table gives $P = 4.7$ per cent. This is only just significant at 5 per cent. and may well influence the confidence with which we accept the apparent association.

In the foreword Penrose says: "Enough of the historical and *legal* (reviewer's italics) background is explained, I hope, to enable the student properly to appreciate the vicissitudes of the concept of mental deficiency." It is somewhat surprising, after reading this, to find no mention of the M'Naghten ruling and the forensic vicissitudes to which it gives rise, even in the sections on "Psychopathic Personality," "Moral Deficiency" and "Mental Defect and Crime".

In spite, however, of these criticisms of detail Penrose has here undoubtedly made a valuable contribution to our understanding of the problems of mental defect. There is no short cut, and it is only by a concentrated and sustained attack from many points of view that we shall eventually obtain a solution. As J. B. S. Haldane remarks in his preface, it is greatly to be hoped "that this book will not only be read by physicians, but by social workers and even by one or two of the Members of Parliament and Peers who have to frame the law as to mental defect and criticise its present administration."

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