BOOK REVIEWS

The Measurement of Linkage in Heredity

By K. MATHER (Dept. of Genetics, University of Birmingham, Eng.) New York: John Wiley & Sons, Inc., Second Edition, 1951. Pp. 149. $1.75.

THIS monograph presents some of the mathematical techniques which may be used in measuring linkage. Most plant and animal geneticists will find the discussions of planning and analysis of experiments helpful. The demonstrations of the use of X^2 are clear, and the many special formulae are useful.

The human geneticist will find three chapters, about one quarter of the book, devoted particularly to his problems. The first of these chapters deals with the problem of determining the likelihood that a particular condition is the manifestation of a homozygous recessive gene. This chapter is concluded with a X^2 test of heterogeneity within the data, a method which Mather frequently uses. Unfortunately, he fails to warn the reader that most statistically significant results of such heterogeneity tests will only be attributable to chance, and will prove nothing relative to the theories tested.

The second chapter on human genetics deals with tests of linkage in man. Mather finds the results obtained by Haldane (1936, *Ann. Eugen.* 7: 28–57) on the segregation of the retinitis pigmentosa locus and sex to have a very small probability on a theory of random assortment, and he states this to be unquestionable evidence for partial sex-linkage. However, the linkage is estimated as 43 ± 3 units, which is reasonably close to random assortment, demonstrating that the manner in which he applied the X^2 did not test solely for the presence of linkage. The remainder of this chapter deals with the u statistics and the problem of completeness of ascertainment, and with the detection of linkage without reference to parental phenotypes. These sections are well written, and it may be regretted that the chapter is completed by references to literature rather than by further exposition.

The last of the chapters on human genetics is on The Estimation of Gene Frequencies. It is useful, although incomplete. Recent works, particularly on blood groups, discuss this problem in greater detail.

Parts of the monograph are unsatisfactory. For example, for backcross data the maximum likelihood method is demonstrated at length, though it is briefly noted that the simpler method in current use gives identical results. On the other hand, the chapter on Symbols and Formulae recommends the simple technique by failing to list the maximum likelihood formula. The Symbols and Formulae chapter does not include a formula recommended in the book for testing backcross data when viability differences occur, and used to estimate the strength of the partial sex-linkage of retinitis pigmentosa. Notice is not taken of the fact that Haldane's more easily derived result differs from Mather's only by one part in three thousand. More counselling on the advantages of various methods seems warranted.

This edition differs from the first primarily by the addition of a section on Fisher's Scoring Method and the chapter on The Estimation of Gene Frequencies.

HERMAN M. SLATIS
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