are not amenable to single factor models we need statistical concepts and large numbers, and, for want of better, have to make do with such records as are available, through our entrances and exits, supplemented by records of various intervening events, such as hospital admission, blood group and occupation. The vast expense of assembling and analysing such data, although trivial compared to the cost already spent on their initial collection, should impose an obligation on both research workers and their patrons to make the data available to others. This would seem an obvious moral need in human data, particularly now that the computer has made this simple, but few authors practice it, and few patrons demand it, in spite of the obvious fact, which has been repeatedly demonstrated at public expense, that those who are most industrious at collecting data often have little idea of what to do with them.

This book is a landmark in the exploitation of public records; Hawaii has good records, a known history, numerous races, both Atlantic and Pacific, a geneticist responsible for major theoretical advances in the specifying and estimating some relevant parameters, and adequate computing facilities. The genetics department itself is better equipped than many British Universities.

The data are introduced, with full details of ascertainment and coding. The authors exploit it, primarily by variance partitioning methods, and the sifting out of significant effects, with due regard for sifting fallacies. Non-significant associations get little attention. Indeed, they are not even considered worth the cost of type-setting in some tables. Computing loads have been reduced by a sequential procedure of " pre-forced " variables, which is poorly explained, and the bias of selecting significant effects is not considered. The primary aim, the estimation of the effects of interracial crosses, has been answered conclusively: Hawaii is too small to show them. The final chapter is a particularly valuable summary of the authors' view and greatly clarifies the earlier work on loads by the senior author.

A most important comment, on page 38, states that " The authors will endeavour to accommodate researchers wishing to use either the program or the data ". Those of us who feel uncomfortable about the assumptions implicit in multiple regression analysis and variance splitting, particularly on observational data, can reasonably be asked to suggest operational alternatives before being too critical.

This book is essential for anyone interested in the population genetics of man, or in the implications of the " load " approach. It is mainly written in the very concise prose style of the senior author. We may hope that, in a few years, sibships will allow an extension of the same basic data to be used for more direct estimates of heritability.

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CHROMOSOME ABNORMALITIES IN MAN

MEDICAL CYTOGENETICS. M. Bartalos and Th. A. Baramki. Williams and Wilkins Co., Baltimore; E. and S. Livingstone Ltd., Edinburgh. 1967. £5.

The first part deals with " general cytogenetics " including technique while the remaining sections consider the phenotypic consequences of chromosome

abnormalities in man classified according to the chromosome or chromosome group involved.

The introductory material gives some attention to the principles of Mendelian heredity but in regard to their determination the book is content with the comment that " after the function of the chromosomes and gametogenesis were understood in some detail, it became possible to give an explanation of Mendel's observations on the chromosome level ". It is, perhaps, fortunate that the authors do not proceed further for it would seem that, although such an explanation is certainly possible, their own appreciation of meiosis is not sufficient to allow them to present it.

For example, in relation to man they write that " because the number is reduced to 23 chromosomes per cell, the first meiotic division is often referred to as the reduction division ". So it is but such a designation is incorrect for the true reduction is yet to come. In fact, the only meaningful way of counting chromosomes at meiosis in relation to DNA content and the Mendelian principles of reduction and segregation is to determine the number of ends and divide by two.

In view of this error it is not surprising that in the indistinct, inadequate and incorrect diagram of meiosis, the homologues at diplotene are shown relationally coiled but without chiasmata while at first metaphase non-sister chromatids are shown associated *distal* to chiasmata which lie *nearer* the centromere than the cross-over points (negative terminalization?).

Similarly, other basic genetic principles are ignored. Thus, in regard to the Turner syndrome the authors write " some investigators believe that short stature is genetically determined—others consider it to be a developmental defect—while a few maintain that it is due to estrogen deficiency ". This manner of presentation implies that these necessarily constitute alternative explanations which, of course, they do not. Further, to present observations and opinions without comment in this way suggests that they all merit equal attention which, of course, they do not. This treatment is not a symptom of objectivity; it rather rests on the indecision and indifference which must obtain in the absence of underlying principles and hypotheses.

Where there is medicine there is money. And those who have taken satisfactory photomicrographs with home-made boxes costing a few shillings will be amused to discover that " excellent photographic results can be obtained using Zeiss, Leitz or Nikon photomicroscopes ". Similarly, those who count chromosomes single-handed by looking down a microscope will be equally entertained by the following " ecological " instructions: " Photographic enlargements are divided into four quadrats by inking two intersecting lines through the metaphase print. The chromosomes in each quadrat are independently counted by two investigators and then the four figures are added ".

On the credit side, the book is attractively produced and, by spelling-out the nature of chromosome mutations (" if one arm of a chromosome is shorter than that of its normal homologue, deletion is suspected ") it will help to bring chromosomes nearer to those who study man in surgeries and hospitals. This, in turn, may even help mankind to overcome its reluctance to admit " that its destiny can be revealed by the breeding of flies or the counting of chiasmata " (Darlington, *Nature*, *187*, 892). But while genetical terms are painstakingly explained, those like arrhenoblastoma, gynecomastia and inguinal herniorraphy are used on the assumption that the reader will

understand them. Thus, the book is a bridge which can carry only one-way traffic. It remains, however, a useful catalogue of human chromosome abnormalities and their effects. As such it deserves the attention of all those who teach or study man in any of his aspects.

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BOOKS RECEIVED

THE UNQUIET MIND. William Sargant. William Heinemann, London. 1967. Pp. 240. 30s.