

REVIEWS

THE ELEMENTS OF GENETICS. By C. D. Darlington and K. Mather. London : George Allen & Unwin Ltd. 25s.

If it may be said that the science of genetics was born in the early nineteen hundreds, then in half a century there have been a great number of books on elementary genetics. Most of these have been written fairly recently and can accordingly claim to be modern. An author's main task, therefore, is not so much the inclusion of all recent knowledge contributing to the foundations of genetics, but rather its orderly arrangement in a logical sequence, and its presentation in a clear authoritative style. Added to this is the secondary task of deciding what to exclude, so that his structure is not so broad as to include material not strictly genetical, and not so high as to contain matter too complex and specialised to be called "elementary."

The Elements of Genetics by C. D. Darlington and K. Mather is an excellent example of its kind. It is a common experience of the specialist that the exposition of the foundations of his subject is both tedious and, to some extent, difficult: definition of new terms the first time they appear, avoidance of assuming knowledge natural to him but strange to his readers, explanation of the subject in the simplest rather than, perhaps, the most interesting manner—all require an unravelling and sorting-out of the knowledge clear to him as a coherent whole. *The Elements* has been set forth with great conscientiousness. An historical presentation is perhaps the more interesting to those who have observed or taken part in the history, but it often involves the explanation and finally the rejection of what are now regarded as false conceptions; this procedure can be confusing to the mind of the student, whose first impressions are probably the most lasting. Such a presentation is here avoided, in favour of a logical description of known facts and accepted theories, except in so far as the historical presentation provides a more striking and as accurate an account. On the lesser point, that of explaining new terms as they appear, there are very few omissions, and these are rendered innocuous by the provision of a clear and comprehensive glossary.

The secondary task, that of deciding the material to be included, is perhaps the more exacting. The book is divided into three parts. The first, headed "Individuals," describes in order: mitosis and meiosis; Mendel's experiments and linkage; continuous variation, including polygenic systems, linkage of polygenes and their biometrical analysis; chromosome and gene changes, and the consequences of these changes. The second, headed "Cells," touches on chemical and physiological processes of genes and molecules, with a description of the expression and interaction of genes; it includes a chapter on the cytoplasm, with an account of plastogenes, plasmagenes, cytoplasmic equilibrium, nucleus and environment, etc.; it describes the action and interaction of nucleus and cytoplasm in development and differentiation, and includes an account of nuclear and cytoplasmic systems with special reference to viruses and the

genetic conditions of cancer development. The third part, headed "Populations," covers a wide field ; this comprises genotypic and segregational sterility, the results of inbreeding and hybridity, and breeding systems ; selection and variability, with reference to Darwinism, and the opposing requirements of fitness and flexibility ; the properties of outbreeding, changes in genetic systems, and evolution of new breeding groups ; the growth of genes, including reference, *inter alia*, to position-effects and "super-genes." Finally, there is a chapter on man and mankind ; and a concluding chapter, co-ordinating the three-level analysis made in the body of the book, and describing some trends for the future of genetics.

It can be seen from this short summary that the structure of the book has a very broad base, and it can be suspected, therefore, that its height is relatively small. In fact, a more descriptive, though longer, title might have been "The elements of genetics and its bearing on related subjects." As such the work is not sufficiently limited to be a textbook for the junior student, nor detailed enough for the specialist who desires a deeper knowledge of his own and related subjects. It is more in the nature of an introduction to genetics, providing a stimulant to the interested amateur and a background of knowledge for the serious student. In the preface the book is described as "the first attempt to represent the whole scope of genetics, the whole of what has always been needed," and as "a survey of the whole territory of genetics." The latter is described as a continent across which "botanists and zoologists may venture to find common ground with bacteriologists and virologists" and in which the investigator of cancer, the practical stock-breeder, the physical chemist, the physiologist and the embryologist play a part. The authors hope "that many, whether wise veterans or innocent enthusiasts, who read this book, will share some of the delight we have had in writing it." The delight it has given the authors is obvious and refreshing. Apart from those to whom the title is misleading, the book should provide much pleasure to all its readers.

On smaller details than scope, there are, however, some criticisms that should be made.

Part III, Populations, represents almost half of the book. This means that the first part, which is basic and therefore the most important from the point of view, at least, of "innocent enthusiasts," is relatively short, and the material in it appears somewhat cursorily treated. There is, for example, only a brief account of linkage, with little or no information on the kinds of crosses which may show it, and no mention of the statistical methods by which it may be detected. A formulation of statistical procedure is not expected, but, if the biometrical analysis of continuous variation takes up a complete chapter, at least an indication of the necessity for statistical knowledge is expected in the chapter in which simple single-factor and linkage ratios are described. Its absence is the more surprising on consideration of the statistical work of one of the authors.

It has been stated earlier that a book on elementary genetics should be presented in a clear, authoritative style. This is not to say that a writer may make sweeping or unverified statements. A few examples will suffice to show that the book under review is not flawless in this respect : p. 210, "There are many types of genetic change, in which viruses, like bacteria, react so characteristically to a particular type of change of host or diet that control seems to be indicated." This statement is not followed by one

giving another widely accepted interpretation, namely that genetic changes in viruses and bacteria, as in higher organisms, are probably undirected environmentally, but only those are observed that can be discerned in a particular environment. Again, p. 253, "Courtship behaviour in fishes, birds and mammals elaborately testifies to the (same) exercise of discrimination" (in choosing a mate). No mention is made of the school of thought which describes the primary function of courtship as that of ensuring synchronisation of male and female in sexual behaviour and in the rearing of progeny. There is much evidence for this among birds, where "courtship display" often takes place *after* the selection of a mate; in fact many ornithologists would describe sexual selection as a secondary function of courtship, and one which is not universally operative. Finally, p. 251, "Tristyly in *Lythrum* (or in *Oxalis* or *Narcissus*) could scarcely be worked on the basis of a series of multiple allelomorphs, and, in fact, it depends on two unlinked genes." The statement is true of *Lythrum*, but it is certainly not true of *Oxalis*, where in *O. valdiviensis* the short/non-short locus is linked to that of the mid/long with a recombination value of about 5.7 per cent. Also, so far as the present reviewer is aware, no genetical results have been published on work done on tristily in *Narcissus*.

In their preface the authors confess that they "do not hope to satisfy the critic who prefers the small, the simple, and the secluded, department." This may well be so; but an equally important subject for hope is that they will satisfy the critic who prefers a scientific work to remain scientific, and not to include the authors' personal political or philosophical views. The statement on p. 354 beginning "our genetic principles, therefore, favour neither the extreme advocate of racial purity nor equally the extreme anthropologists, philosophers and historians (whether liberal, Marxist or Catholic) who dogmatically assert what they desire to believe . . ." is, whether or not it is true in its implications, an unfortunate lapse in a book otherwise excellent as a technical work.

The preface also provides a warning to the reader that he must "don his doubting glasses at the point he feels proper." A decision upon the point which is proper is no doubt easy for the "wise veteran," but it may be difficult for the "innocent enthusiast" for whom also the book is written. The book will doubtless, however, provide stimulation for the latter, and, for the veteran, the pleasure peculiar to deciding on what subjects the authors, as they phrase it, have "travelled too fast and too far."

Space in this review has necessarily been devoted more to unfavourable than to favourable criticism. It must be left to the reader to appreciate all that is admirable, and he will no doubt realise that the reviewer has found it difficult, not to reveal matter for commendation, but to find lapses unworthy of the general excellence of the book. It contains a wealth of up-to-date information, many useful drawings and diagrams—several of which present their facts in a new and delightfully clear and concise manner—and even some valuable opinions of other geneticists, opinions which one may reasonably suspect would never be published in any other way. Perhaps the greatest value of the book lies in the fact that it is the vehicle of much original thought on the part of its two authors, both of whom have contributed much in the past to the science of genetics.

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