

## REVIEW

GENETICS. By Edgar Altenburg. London : Constable, 1947. Pp. xii+452. 16s. net.

When Bateson was writing *Mendel's Principles of Heredity* it was still possible to cover the whole of genetics, both observations and theory, in one account. This possibility vanished, however, almost immediately after the appearance of Bateson's book in 1909. Since that time it has always been necessary to select the material which is to be included in any book on genetics.

The choice of material depends, of course, primarily on the aim of the book. This may be to bring together all the observations of a particular kind, such as chromosome numbers, gene segregations or technical methods. Or it may be to present a detailed consideration of both experiment and theory in some particular and limited branch of the subject. Or it may be to present students with a textbook which covers all branches of the subject, but treats each of them only to a limited extent.

Dr Altenburg's *Genetics* is of this last kind. He aims, so he tells us, at giving the student an account of genetics as a growing science, of genetics as it is concerned with evolution, development and cell chemistry as well as in its more mechanical aspects. The structure of the book, however, reflects the author's training as a zoologist, and experience as a member of Morgan's early *Drosophila* laboratory, as much as it does his avowed aim.

Chromosomes are introduced right at the start, which is in fact an account of mitosis and meiosis. Then follows what comes to seem almost like a digression, into the inter-relations of heredity, environment and character, before the main trend is resumed with an account of mendelian behaviour. This is elaborated and extended in relation to multiple factor inheritance, sex determination, inbreeding and outbreeding, and selection. Linkage is introduced at this point and related to meiosis. Next follow multiple allelomorphs, structural change, especially as it is concerned with cytogenetic chromosome maps, polyploidy and polysomy. Turning to mutations, their artificial production is discussed as well as their natural behaviour. Together with an account of balanced lethals and complex hybridity, all this takes up eighteen chapters. The book is then rounded off with a single chapter on heredity and development, including cytoplasmic behaviour, and another on the genetical basis of evolution.

That the dismissal of development and evolution in their genetical aspects with but two chapters out of twenty between them, represents an unbalance of treatment, few will probably deny. The cause from which it springs, however, may be less readily admitted. Altenburg's treatment of any phenomenon or theory appears to have been governed largely by the confidence which he felt in the relevant experimental evidence and its interpretation, rather than by the potential importance of the subject itself. At first sight this might seem a desirable rule in any text designed

for students. It is nevertheless one which, if followed at all closely, must inevitably lead to distortion. Thus, for example, the behaviour of ring chromosomes in *Drosophila melanogaster* receives, and indeed on this rule must have received in January 1945 when the book was written, almost as much attention as does cytoplasmic effects in animals. When, however, the importance is remembered of the cytoplasm as the nucleus' agent in development, such a treatment must seem cursory even at that date. More recent developments in genetics serve only to emphasise this point.

In the same way extra-nuclear inheritance in plants is referred entirely to the plastids, whose distribution from cell to cell and transmission from mother to offspring can be followed by the same microscopic method which serves for chromosomes. The cytoplasmic element in the inheritance of male-sterility in maize, flax or *Nicotiana* may not indeed be formally separable from the plastids; but neither is plastid inheritance formally distinguishable from that of other cytoplasmic elements. We must recognise that reference of male sterility to plastids is made much less reasonable than its reference to other cytoplasmic constituents by considerations beyond those of mere hereditary transmission. We need, in fact, something more than the approach of formal genetics, whether it is to the task, which may seem trivial to a zoologist, of describing extra-nuclear inheritance in plants; or to that, which few will regard as trivial, of seeing genetics in the broader setting at which Altenburg avowedly aims.

The treatment of evolution is similarly limited. Natural selection is discussed in its formal aspects, but no attempt is made to use it in the interpretation of those broad similarities and differences which are so important to the understanding of how genetic systems determine the course of evolutionary change and are, in their turn, determined by it. Indeed, breeding systems, whose importance in relation to variation and selection was at least partly understood by Darwin, receive no greater mention than does Darwin himself. His name is not to be found in the index.

The full appreciation of the inter-relations of genetics and natural selection, of Mendelism and Darwinism, requires of course a consideration of plants equally with animals; and it may be that Altenburg's treatment has suffered for this reason. Certainly he markedly subordinates plants to animals, and at times his discussion suggests an utter unfamiliarity with plants and plant genetics. Some of us will be surprised to learn, for example, that "the corolla (is) the trumpet-shaped part of a flower, consisting of the fused petals." We may even venture to think that students to whom such an explanation is necessary would be better employed in obtaining some further training in elementary biology before taking up genetics. We can only conclude that the plant kingdom is foreign territory to the author, and this conclusion will be strengthened, to take another example, by his use of the germ cells as including not only the gametes but also all cells ancestral to them. Such a usage, whether it is desirable or not in animals, would in plants reduce the term to a farce; for even in many of the flowering plants almost every cell is potentially a germ cell in this sense.

These lapses, of which a few examples have been cited, are made the more dangerous by the dogmatic style of writing. Some dogmatism is scarcely to be avoided in a student's book, but the arts of persuasion are not wholly out of place even in writing such a text.

The book will have its uses : that is ensured by the provision of so much information about genetical method and so many problems for exercise. It cannot, however, be regarded as attaining its author's object. In writing it he has not managed to strike the delicate balance between the narrowly formal and the broadly comprehensive, between the proven fact and the likely inference, which the presentation of genetics as the living heart of so much biological theory must demand.

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