REVIEWS

GENETIC HOMEOSTASIS. By I. M. Lerner. Edinburgh : Oliver and Boyd. 1954. Pp. 134. 12s. 6d.

Dr Lerner is well known for his earlier work *Population Genetics and Animal Improvement*, and his new book should therefore be assured of a wide and appreciative circle of readers. It deals with the same general topic of the genetical properties of populations, but differs from its predecessor in being less a wide survey of methods and problems than an essay on a particular and very important aspect of the subject. Populations are resistant to change in their genetical constitutions—they show an inertia, an element of self-regulation, or genetic homeostasis : Dr Lerner sets out to assess the evidence as to the nature of this resistance and to discuss its causes. In particular he seeks to relate it to the regulation of development, the canalisation, stability or developmental homeostasis, which is displayed by the individual organism.

The collection and appraisal of the evidence is thorough and most illuminating, the discussion of phenodeviants being especially valuable. No doubt can be left of the occurrence of both developmental homeostasis and genetical homeostasis (to use Lerner's term) or of their dependence on the balance and organisation of polygenic systems. Two of the conclusions that Lerner reaches will, however, be less widely acceptable. The first of these is that heterozygosity *per se* can be of importance in development, or to put it the other way round, " Not only gene contents but homozygosity as such must be considered to play a rôle in inbreeding degeneration " (p. 75). The second is set out on p. 118 in the words " The thesis here advanced is that the former (adaptedness of the individual) is mediated by heterozygous advantage in buffering ability as a consequence of which populations become endowed with the latter (adaptability). The buffering of populations against environmental change . . . is a by-product of the buffering of individuals ", and further (p. 120), " Error is minimised in a successful population by developmental homeostasis. Genetic homeostasis arises as an after-effect ".

If I read him aright, Lerner's view could be paraphrased in the following way. Heterozygotes, because they are heterozygous, show a better buffered development (*i.e.* show developmental homeostasis) and therefore have an advantage in fitness over homozygotes. Having such an advantage, they are held in the population, which will therefore conserve its variability and resist change under any force of selection favouring more extreme types and hence tending to increase homozygosity (*i.e.* show genetic homeostasis).

Now, few will seek to dispute that heterozygotes in general show more stable development (or better buffered development, or superior developmental homeostasis, or whatever form of expression one chooses) than do homozygotes in outbreeding species ; or that populations of such species resist change under selection (or show genetic inertia, or genetic homeostasis). To interpret this as depending on innate capacity of heterozygosity to give superior development is, however, another matter. There are

several objections to this view, which to me hedges a mechanical concept essential to the understanding of genic transmission with unproven physiological restrictions ; but one of them must surely be decisive in itself. Heterozygotes do not show this same property in inbreeding species. Lerner seeks to meet this objection early in his book when he writes " . . . the hypothesis . . . is applicable only to populations with genetic systems based . . . on cross-fertilisation ". (p. 7). Inbreeders, apomicts and so on, do certainly differ from outbreeding species but hardly in the basic genetic principles upon which they depend. To argue to the contrary is to see rye resembling, for example, *Drosophila*, but differing in the basic properties of heterozygosity from wheat, with which it is so closely related as to give hybrids ; or to endow heterozygosity in the tomato, as we know it in this country, with properties unknown in its South-American ancestor and yet shared by *Galeopsis* and barley. Inbreeding and outbreeding are too closely interwoven in evolution to allow of this escape.

Yet object as we may to Lerner's final conclusions, we cannot fail to thank him for his book. It not only sets facts before us but it makes us think about them, and it does so with a style of scholarly presentation which is all too rare. *Genetic Homeostasis* may be criticised, but it will not be ignored. No geneticist should fail to read it : we all have much to obtain from Dr Lerner. KENNETH MATHER.

EVOLUTION AS A PROCESS. Ed. Julian Huxley, A. C. Hardy, and E. B. Ford. *Contributors* : G. R. de Beer, E. J. H. Corner, H. B. Cott, James Fisher, Sir Ronald Fisher, E. B. Ford, J. B. S. Haldane, A. C. Hardy, Julian Huxley, David Lack, Ernst Mayr, Bernhard Rensch, P. M. Sheppard, H. N. Southern, N. Tinbergen, T. S. Westoll, E. N. Willmer, J. Z. Young and S. Zuckerman. London : George Allen and Unwin. Pp. 367. 25s.

At some stage in the preparation of this volume, its contributors hit upon the happy idea of turning it into an unpremeditated *Festschrift* in honour of its senior editor, Dr J. S. Huxley ; and if all else in the book were controversial, the truth of its foreword, which speaks of Huxley's own splendid contributions to biology and the contributions which he has caused others to make, is surely not to be denied.

Huxley's own article, like Fisher's later on, deals with certain popular misconceptions about the content and import of the genetical theory of evolution by selection. Misconceptions there must be, in a world in which we cannot all be geneticists ; but why are they so distressingly popular ? How did it get about, for example, that evolution is the outcome of the blind selection of chance mutations (for that is what Darwinism is popularly supposed to be) ? Perhaps geneticists themselves are partly to blame. Huxley writes :

> " Natural selection has certain obvious limitations. It can only produce results which are of immediate biological utility to the species ; and being blind and automatic, it is incapable of purposeful design or foresighted planning."

I should be sorry to be obliged to defend this view against the censure of a determined critic. What can " blind " mean except undiscriminating and undirective, exactly that which selection is not ? And why should its results be confined to those which are of immediate biological utility