REVIEWS

MORPHOGENESIS. An Essay on Development. J. T. Bonner. 1952 London : Oxford Univ. Press. Princeton, New Jersey : Univ. Press. Pp. i-vi+291. Price \$5.00.

This is a much-needed philosophic discussion of development in plants and animals. It is delightfully written and well illustrated (although not well indexed). It contains, however, an unresolved conflict between the ideas the author began with and those he reached at the end. Dr Bonner is governed by the classical points of view of embryology. But he asserts at the beginning a wise rule that large results must be explained in terms of small causes. The classical point of view he has thought out widely and well but he has not made the fresh start that he sees the need of making with the small causes within the cell and the nucleus. He does not, for example, seem to grasp the meaning of the interlocking events in the cleavage of the *Ascaris* egg. Nor does he realise that the pollen grain and the embryo-sac are developmentally the most significant and accessible parts of the plant. No writer in this field is better qualified to make use of such knowledge and it is to be hoped that Dr Bonner will continue to develop his ideas, and on an even deeper foundation. C. D. D.

HETEROSIS. Ed. J. W. Gowen. Iowa State College Press, Ames. 1952. Pp. 552.+ix Price \$5.75.

This volume comprises the thirty papers given during a five week conference on Heterosis held at the Iowa State College in the summer of 1950. As the preface points out, the State of Iowa has a direct and vested interest in heterosis, for its economy is based on hybrid corn. The conference was therefore organised with the aims of analysing the means by which this phenomenally successful development has been achieved, of considering the genetical systems on which it is based, and of exploring the possibilities of the future.

The organisers of the conference approached their task in no narrow spirit. The list of contributors does not merely call a roll of eminent maize breeders, but also includes many who are concerned with the understanding and use of heterosis in other species both domesticated and wild, and with the physiological, cytological and biochemical, as well as with the more formally genetical aspects of the problems. Some of the papers may seem to have little direct bearing on heterosis, but we can be grateful that they are included for they record work, such as that of Rhoades on peculiarities of chromosome behaviour leading to preferential segregation, which have a great interest in their own right.

Comment on each of the papers would be so demanding of space as to be out of the question, and to pick out for detailed discussion a few from the wealth that is offered to us would be invidious. The subject is approached from all points of view. The historical introduction by Zirkle, and Shull's own account of his early observations and experiments can hardly fail to be read with interest by anyone who seeks to learn the background of genetics as well as of plant breeding. Gene action is covered by several papers including an unusual and interesting discussion of seed development by Brink. Anderson and Brown, and P. Mangelsdorf consider the part played by hybridisation in the history of maize ; Irwin deals with

specificity of gene action especially in blood group determination ; and Dobzhansky discusses the adaptive significance of heterosis in populations. The notion of overdominance is, of course, taken up in a number of papers, that of Crow considering in particular its importance for the maintenance of variability in populations. Many of the authors discuss the methodology of breeding for heterosis, Sprague's paper being especially informative in the experimental evidence that it provides about the various schemes that have been proposed. A. J. Mangelsdorf sets out a series of postulates as a basis for the discussion of heterosis and other problems of plant improvement, and these can hardly fail to be of interest to geneticists and plant breeders alike, even though the author himself would hardly hope for their complete and universal acceptance.

Some of the papers may seem to many geneticists to be rather heavily statistical, but as Hull, for example, has repeatedly emphasised, only by this means can the problem of breeding for combining ability be approached with any real prospect of success. Among these statistical contributions, that of Comstock and Robinson is noteworthy for its discussion of the efficiency of experiments designed to partition the heritable variation and to measure dominance. Finally, we should note a review by the editor of the volume, J. W. Gowen, of experiments in *Drosophila*, from which a biometrical analysis of the agencies affecting heterosis was possible. His conclusion that "genes in quantitative inheritance are not stable in their effects" accords well with the evidence from other lines of research and emphasises once again the relative or conditional nature of familiar genetic concepts when one moves into the study of continuous variation.

The styles, treatments and aims of the thirty papers are as varied as their subject matter, and not all can perhaps hope to command either a wide audience or general acceptance. There is, however, something for almost every kind of geneticist, and much of the volume is essential reading for the student of continuous variation and for the practitioner of plant and animal breeding. The organisers must have been well satisfied with the success of their conference.

K. MATHER.

TEXTBOOK OF GENETICS. By Wm. Hovanitz. 1953. New York . Elsevier Press, Inc Pp. i-ix+413. Price \$5.95.

Genetics has come to have the most elaborate theory of all sciences. Having collected his matter the writer of a text book of genetics has therefore to find out the processes of reasoning by which the matter has developed and to illustrate these processes by a coherent arrangement of the book.

Professor Hovanitz has collected all the matter that he needs, although not perhaps remembering very well where it came from. But he trips over the reasoning and the arrangement. At the beginning he attempts no clarification or definition of ideas. He distinguishes on page 1 emphatically in italics between "*breeding*" and "*experiment*". But is breeding not an experiment? On the same page he offers us the "germplasm" without any explanation, as though we all knew what that was. But does the author himself know? Introducing his chapter 16, Hovanitz reveals his own mode of reasoning. "That there must be a relation between the gene and the character follows from observation that the substitution of one allele for another results in the substitution of one character for another." But surely it does not "follow from the observation" ; it merely paraphrases