REVIEWS

MATHEMATICAL TOPICS IN POPULATION GENETICS. K. Kojima (Ed.). Springer-Verlag. Pp. 408. $18·70.

The topics chosen for this, the first in a promised series of books on biomathematics, are appropriately in the area of population genetics which forms perhaps the most coherent body of biomathematical knowledge. The volume is a collection, mainly of review papers covering a fairly wide range of topics in mathematical genetics. Wright, Kimura and Schaffer review various aspects of the stochastic theory of population genetics and the contribution of random genetic drift to evolution. Turner deals with changes in mean fitness and Fisher's fundamental theorem of natural selection, Hill and Robertson review the problem of limits to artificial selection experiments. Crow deals with the genetic load and the cost of natural selection and Kojima and Lewontin provide a useful review of models for linked loci. The remaining papers deal with somewhat more restricted topics. Richardson discusses the types of distributions that can be used to describe dispersion; Cockerham discusses systematic inbreeding models which lead to a maximum avoidance of inbreeding in populations of a given size; Li provides a very complete and elegant discussion of the incomplete binomial distribution; Sved and Mayo provide an interesting historical review of Fisher's theory of the evolution of dominance placed in a modern setting and Levins provides a rather abridged discussion of the interaction of ecological problems with population genetic models.

Inevitably the reviews reflect the biases of their authors. In some cases, such as the article by Sewell Wright, this adds colour and interest to the problem. In other cases, such as in the article by Turner, one might wonder why an otherwise useful survey of the problems of extending and understanding Fisher's fundamental theorem of natural selection, should be accompanied by so many criticisms of Fisher's contributions to the subject. Crow's review of the problem of the genetic load and the cost of natural selection should perhaps have been counterbalanced by a discussion of the validity of the load concept itself. It is understandable that Robertson devoted so little space to the problem of interaction in considering the effect of linkage on limits in artificial selection experiments, since the problem is complicated enough without it. One might, though, wonder whether he is right in suggesting that interaction is of so little importance, especially in view of the fact that it could no doubt have a very profound effect on the conclusions drawn in its absence. No doubt the authors of the papers will rightly say that these criticisms are as much a reflection of the biases of the reviewer as of the authors!

The volume might have gained from an attempt to make the selection of papers cover somewhat more systematically the field of mathematical population genetics. In this case, the book could have been more readily recommended as a textbook. However, there is no doubt that the collection of papers provides a very useful survey of many relevant topics in the field for those who wish to learn more about what is done by mathematical population geneticists and at the same time can serve as a useful reference for those already acquainted with these problems.

I heard of Ken Kojima's untimely death just as I was completing this review. His loss will be keenly felt by all his friends and colleagues in the field of population genetics.

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THE BIOLOGY OF THE CELL CYCLE. J. M. Mitchison. Cambridge University Press, 1971. Pp. 313. £4·60

Perhaps the first thing about this book which ought to be made clear to geneticists is that it does *not* deal with mitosis and the mechanisms of cell cleavage. Professor Mitchison has deliberately omitted these aspects of the cell cycle on the grounds that they were well covered by Mazia in a long review published in 1961. That a ten-year-old review can still be regarded as definitive suggests that the field is hardly in a state of explosive development and, indeed, one gets the same impression from this book, which provides a careful record of exploratory probings rather than major new insights or news of revolutionary advances.

The author does attempt, with some success, to bring unity to his subject by collating results from all kinds of cells. Bacteria and mammalian cells are given their expected prominence but just as much emphasis is placed on the " lower eukaryotes ", including such diverse forms as Schizosaccharomyces (the author's own speciality), Tetrahymena and the slime mould Physarum. The great advantage of this last organism is that the mitosis in the plasmodium is naturally synchronous; in most other experimental organisms methods for inducing or (better) selecting for synchrony are of paramount importance, providing the necessary basis for all observations on the cell cycle which cannot be made on single cells. The early chapter which reviews synchronisation procedures will be especially valuable as an authoritative account of the potentialities and pitfalls of the various alternatives.

Subsequent chapters deal with DNA synthesis (separate chapters on eukaryotes and prokaryotes), RNA synthesis, cell growth and protein synthesis, enzyme synthesis, cell organelles and the control of division. The treatment of DNA synthesis in bacteria is a little brief considering how much has been published in this area, but the essential outlines of what is known are well presented. It is good to have such topics as bi- *versus* unidirectional synthesis, rate of replication and control of initiation considered from a comparative point of view. The chapter on enzyme synthesis, with emphasis on the contrast between the step-wise and continuous patterns shown by different enzymes, is particularly interesting and comprehensive. Both in *Bacillus subtilis* and in yeast the relation between the timing of enzyme synthesis and the chromosomal location of the responsible gene seems to be a real one, but at present one can only speculate as to the significance of this fascinating observation. The final chapter on control of cell division deals mainly with experiments, especially on Tetrahymena, which define transition points (or " points of no return "), which presumably represent stages in the cell cycle at which structures or substances necessary for cell division become fully developed and stabilised. The biochemical or morphological characterisation of these structures and substances is as yet at a very preliminary stage. A helpful feature of the book is the provision of brief