

PHYSIOLOGICAL GENETICS. J. G. Scandalios (Ed.). Academic Press, Inc., New York, 1979. Pl. xii + 280. Price: \$24.00.

The title of the book, *Physiological Genetics*, interested me and made me think about what I hoped to find inside its covers. Physiology concerns the ways that the component parts of multicellular organisms interact with each other and regulate the metabolism of the whole organism. The homeostatic mechanisms involved regulate the internal milieu of the organism in the face of changes in external environmental factors, both physical, chemical and social, and coordinate the changes in function that occur as each organism differentiates and matures. Such systems depend, directly or indirectly, on the functioning of proteins and nucleic acids and are thus subject to genetic variation. Physiological genetics would be concerned with the way that such genetic variation affected the homeostatic mechanisms and the ways that organisms adapted to environmental variation. Thus it would range from ecological and behavioural genetics on the one hand to molecular and biochemical genetics on the other, and from the consideration of genetic variation within the range of normality to the use of mutations with pathological effects in the analysis of physiological processes. Hopefully an edited collection of chapters on genetics would draw its examples from both plants and animals and would cover systems with very different time-spans of action. Possible subjects might include the transmission of information in the nervous system, the genetics of salt tolerance and the photoperiodic control of flower development.

When I read the seven contributions that make up the book I was disappointed, for most of them do not really tackle physiological systems. Two of them have very little to do with physiological genetics. These are a comparison, by Parke and Carlson, of selection systems for plant cells in culture with those for microorganisms and a review of genetic polymorphism in enzymes by Johnson. The latter does contain the interesting suggestion that if polymorphism were found amongst the enzymes of photosynthetic carbon fixation then it would be interesting to study the differential effects of varying light, temperature and water potential upon various genotypes. Scott discusses the biochemical genetics of development in *Neurospora*, *Mucor* and *Dictyostelium*, concentrating on the possible role of cyclic AMP as a central control molecule in the regulation of differentiation in response to environmental variables in these lower eukaryotes. Two chapters describe some of the changes that occur in particular enzyme systems during the development of higher eukaryotes. One of them, by Scandalios, outlines the genetics and biochemistry of the catalase enzymes in maize, just mentioning the possibility of control by light and by abscisic acid. The review by Paigen deals with a wider range of proteins: glucuronidase, galactosidase and histocompatibility antigens in mice, aldehyde oxidase and amylase in *Drosophila* and esterase in maize. He discusses the regulation of the levels of each of these proteins, in a variety of tissues, during the development of the organism in relation to the location and mode of action of the "temporal" regulatory genes involved. He divides the systems into those with proximate, cis-acting, regulatory loci and those in which the structural and regulatory loci are on different chromosomes. Almost perversely, in view of his own work on the regulation of glucuronidase by testosterone, he almost completely avoids discussing regulatory factors,

such as hormones, that are external to the differentiated cells in which the enzyme changes occur. Even so, he ends his interesting chapter by suggesting that homeotic mutants in *Drosophila*, which appear to be cell-autonomous, code for hormone receptors. The chapter by Ho on the hormonal control of gene expression does deal with a topic that is central to physiological genetics. It is restricted to a description of the effects on nucleic acid and protein synthesis of several steroid hormones and gibberellic acid. Apart from a paragraph on dwarf cereals the chapter totally lacks consideration of genetic variants affecting responsiveness to steroid, catecholamine and peptide hormones. Such variants range from those affecting the relative affinity of receptors for peptides differing by a single amino acid to mutations that remove the receptor molecules entirely. In addition, the effects on gene expression in target organs of quantitative and qualitative variation in the hormonal signals were completely ignored. For example, the polymorphism found amongst hippopotami for antidiuretic hormones of differing potency must have considerable consequences for the water-relations and physiology of these amphibious mammals.

The chapter I found most rewarding was the one by Levings and Pring on the mitochondrial basis of male sterility in maize and its relation to susceptibility to southern corn leaf blight. Fascinating, but not something I had expected to find in a book on physiological genetics. Perhaps I should have been less disappointed had the volume not had the same title as Richard Goldschmidt's classic. A title like "Some Aspects of Biochemical and Developmental Genetics of Eukaryotes" might have conveyed a better ideal of the contents to potential readers.

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INBRED AND GENETICALLY DEFINED STRAINS OF LABORATORY ANIMALS. Parts 1 and 2. P. L. Altman and Dorothy D. Katz (Eds.). No. III in Biological Handbooks, Federation of American Societies for Experimental Biology, Bethesda, 1979. Pp. 418+319. Price: not stated.

This handbook is a mine of information about laboratory rodents, rabbits and chickens. As well as the lists of inbred strains, their origins, characteristics and current holders, that the title leads one to expect, there are data of interest to geneticists on many other aspects of these animals. There are descriptions of mutants, classified by mechanism of action and by linkage group, for all of the species and linkage maps for several of them. The genetic map for the mouse requires two full pages. The karyotypes of the species are described, with photographs of the banding patterns in most cases. Chromosomal variants are listed together with the strains carrying them. Details of the immunological and immunogenetic characteristics of each species are given, which takes 50 pages for the mouse. There are also useful sections giving details of reproduction and of the pre- and post-natal stages of development. The various types of spontaneous and transplantable tumours are listed for each species and their incidence in different genotypes catalogued.

Part one of the handbook covers the laboratory mouse and rat and part two deals with hamsters, guinea pigs, domestic rabbits and chickens. Almost