

valuable and complementary chapters by R. Harris and J. C. Woodrow on the genetics of human organ transplantation and some aspects of immunogenetics, which give a most readable and practical introduction to this new but rapidly expanding field. The last chapter comprises a miscellany of topical subjects which were clearly difficult to relate to the rest of the book. It covers amyloidosis, homocystinuria and the porphyrias; genetics and schizophrenia; the *XYX* syndrome; chromosomes and abortion; chromosomes and leukaemia; and the genetics of diabetes mellitus and of diseases of the gastrointestinal tract. Some of these brief reviews seem too condensed and make one wish that certain of them (such as the chromosomal sections) which are well dealt with in other works could have been excluded in order to expand the others. The references, however, provide a useful entry into the fields concerned.

This monograph, which is produced with the publishers' usual style and accuracy, will be a valuable source for all concerned with keeping their medical genetics up to date, especially those working in subjects affected by advances in immunology and by the molecular biology "explosion". It is not an easy book to read—the multiple authorship and the nature of the content (involving the interpretation of so many experimental results) ensure that—but there is no section that will not repay study. The book's prime virtue is that it brings so many topical subjects together under one cover.

E. H. R. FORD

STATISTICAL GENETICS

Evolution and the Genetics of Populations

By Sewall Wright. Vol. 1: Genetic and Biometric Foundations. Pp. vii + 469. (University of Chicago Press: London and Chicago, October 1968.) 135s.

Sewall Wright, Haldane and Fisher are effectively the three founders of statistical genetics. Of these, only Wright is still living, and still able to bring forward new ideas. It is very welcome that he has decided to present his work on evolution and population genetics in a single connected form, making it more readily appreciated and more easily available.

This will be a three volume work. The book reviewed here is the first part. It is concerned only with laying the foundations of the subject.

The first five chapters are essentially a concise summary of genetic theory: chromosomal replication and crossing over, the fine structure of the gene, mutations, nongenic inheritance, and the nature of the developmental process leading from genes to observed characters. The discussion is stimulating but very condensed. It will be suitable for an experienced geneticist who wishes to see the subject as a unified whole, with perhaps new viewpoints and new perspectives. It is also useful as a book of reference, but it would be difficult for a beginner.

Chapters six to twelve deal with biological frequency distributions, their form, description (by moments, multimodality and the like) and interpretation. The content is largely standard but illustrated by a large number of varied examples. Chapters thirteen and fourteen are an account of Wright's special contribution, the method of path analysis and its applications to disentangling a complex system of relationships.

Chapter fifteen deals with the genetics of quantitative variability, where in general we have to deal with the combined effect of several gene loci. It shows how, by making successive crosses and backcrosses, one can get estimates of the degrees of dominance, interaction and the number of loci involved. Sometimes one or more major factors can be isolated.

All these themes are lucidly recapitulated in the final chapter. But their applications to population genetics and

evolutionary theory are only barely touched on in the present book; for an adequate discussion we must wait for the later volumes.

CEDRIC A. B. SMITH

GERMFREE ANIMALS

The Germfree Animal in Research

Edited by M. E. Coates, in association with H. A. Gordon and B. S. Wostmann. Pp. xvii + 289. (Academic Press: London and New York, August 1968.) 70s.

MANY investigators still seem to consider germfree animals either as something incredibly new or something of a scientific curiosity. This reputation is probably because previous textbooks in the field of gnotobiotics have dealt almost exclusively with the techniques involved in the production and maintenance of germfree animals, while their value as research tools has been virtually ignored. *The Germfree Animal in Research* has gone a long way towards putting this deficiency right, and although about one-third of it is concerned with techniques and the latest developments in equipment, the remainder is devoted, almost exclusively, towards the special characteristics of germfree animals and therein their value.

Pleasant shows, for example, that the germfree animal is capable of meeting the demands of homeostasis, growth, reproduction, survival and the usual non-microbial stresses and strains. The Lobund germfree rats and mice are now in their twenty-second and twenty-eighth generation respectively, and still reproducing satisfactorily. On the other hand, third generation rabbits were found to be totally infertile, probably as a result of inbreeding and not of germfree status. A section on survival outlines the hazards of caecal distension and a variety of kidney lesions in rodents and guinea-pigs; whereas in lambs and kids there is evidence in the lungs of an allergic response, probably to cows' milk.

The anomalies of germfree rats and mice are described, and the differences that can exist between the germfree animal and its conventional counterpart are illustrated by, first, a reduction in the number of physiological standards, and, second, an accumulation in the intestinal contents of certain metabolites.

Csaky confines his discussion to the regulation of water permeability in the intestine involving the microbial flora in water uptake, and emphasizes the possible role of intestinal bacteria in water metabolism.

The chapter on lipid metabolism of germfree mammalian and avian species contains a review of published data up to June 1967. The authors found that the presence of an intestinal microflora resulted in an increase in type and amounts of excreted lipids as compared with the pattern found in germfree animals, and they conclude by giving a valuable appendix containing a list of bile acids and sterols mentioned in the chapter.

The defence mechanisms of germfree animals are covered by two authors. Wostmann shows that the absence of stimulation by a viable microflora reduces exogenous stimuli to a level which appears to prolong the effects of stimulation by a specific pathogen. Bauer describes the lymphatic tissue in germfree animals and clarifies some of the aspects of the synergistic relationship between animals and their microbial environment.

Carcinogenesis in axenic animals is summarized by Salomon, who deals with the development of spontaneous neoplasms and known carcinogenic agents, ionizing radiation and viruses that may produce tumours in axenic and holoxenic animals. Von Bekkum introduces the reader to the somewhat neglected field of radiation biology. This account should stimulate further investigation into the effects of specific microorganisms on the development and manifestations of the various forms of radiation injury.