

at the amino acid level, whereas now much is being accumulated at the nucleotide level. The committed neutralists would argue that the faster rate of evolution at the first vs. third base of the codon in non-coding sequences is evidence of neutral evolution; but is that important? Later, when discussing polymorphisms and their possible causes, Gale perhaps gives less attention to the neutralist view than it deserves.

Apart from "mainstream" topics, there are short discussions on the evolution of dominance and of altruism, and on the role of hitch-hiking.

Overall, I consider this short text (c. 160 pages plus appendices) to be an excellent introduction to the theory and applications of population genetics.

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GENETIC CONSEQUENCES OF MAN MADE CHANGE. J. A. Bishop and L. M. Cook (Eds). Academic Press Inc. (London). Pp. XIV + 410. Price: £23.00.

This well researched book comprises nine chapters concerned with genetic effects of man-made change. The book contains many excellent, often important, examples of natural selection. It also shows how a study of population genetics might be used to understand environmental problems such as pest-control and pollution. The references are combined with the author index and placed with the subject index at the end of the book. The book is intended for a wide audience and a knowledge of general genetics to college or university level is said to be assumed.

The first chapter serves an introduction and summarises aspects of gene structure, action and variability which are relevant to the topics described by various authors in later chapters. A very short algebraic introduction to population genetics is also included. I found the description of the genetical control of copper tolerance in *Mimulus guttatus*, which was presented in a section on genotype-environment interaction, to be unconvincing.

The next chapter is primarily concerned with the development of resistance in rats to the poison, warfarin. Here, knowledge of the physiology and biochemistry of resistance are used together with the principles of population genetics to explain the distribution of resistance in natural populations.

Insecticide resistance, its genetics, biochemistry and evolution are considered in two highly informative and important chapters. The biology of insecticide resistance is then used in an attempt to define a strategy for the control of the development of resistance in populations.

Adaptation to air pollution, in particular through industrial melanism, next provides a useful summary and update to the comparative responses to industrial pollution of several species, moths in particular. The reader is also introduced to the influence of the mating system upon frequency of melanic forms in the ladybird *Adalia bipunctata*.

Higher plant populations are next considered with a review of tolerance to heavy metal contamination of the soil. Herbicide resistance is also mentioned. The ecological genetics and evolution of tolerance are considered and, as the author so often points out, there is still room for sound

genetical study in this field. Indeed, I found aspects of the discussion of the genetical control of heavy metal tolerance in *Agrostis tenuis* (in particular reference to the number of loci controlling the character as inferred from W_r/V_r graphs) to be either misleading or a very superficial appreciation of biometrical genetics.

The evolutionary consequences of monoculture are presented as a study of the effect of man's agricultural practices upon genetical variance in domesticated species and their diseases. It is a discourse with an historical viewpoint, interesting and easy to read. A potentially attractive area for population genetics is provided next with a review of man's probable effects upon microbial evolution. The chapter deals with aspects of genetical systems in bacteria as well as the development of antibiotic and other resistance.

Lastly, methods for the genetical analysis of quantal data obtained from resistance and susceptibility studies and the estimation of selective values from phenotypic data are presented. The procedures are presented as computer programs written in Algol and require access to NAG routines or their equivalents. The programs were uncomplicated and I felt that the space they occupied could have been better used with a more critical assessment of the statistical procedures used for the estimation of selective values by the present and previous authors. It was not at all clear why the described procedure, based on a least-squares approach to estimate the fitness of phenotypes, was preferable to easily constructed maximum-likelihood methods. I was also irritated by the inclusion of a very trivial gene simulation programme.

As a whole the book is valuable and the collection of references will be of considerable use to the critical reader or those just requiring further information. I hope the book will be a stimulus to those who are interested in environmental problems.

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THE EXTENDED PHENOTYPE. THE GENE AS THE UNIT OF SELECTION. Richard Dawkins. W. H. Freeman and Co. Ltd., Pp. VII + 307. Price: £9.95 (H/B)

"Gentle 'individual selectionist', we really do almost agree, at least in comparison to the group selectionists: It is just that you *see* it wrong." (Dawkins, p. 6).

Well over a decade ago, G. C. Williams and many others led a revolution against the concept that evolutionary adaptation served the interests of the species or social group. Group selectionism was sometimes explicit, but more commonly mindlessly implicit. Statements about this or that having "survival value for the species" abounded in the text books and journals like leaves on trees. The battle against group selectionism was not won easily: "We painfully struggled back, harassed by sniping from a Jesuitically-sophisticated and dedicated neo-group-selectionist rearguard, until we finally regained Darwin's ground . . ." (Dawkins, p. 6). Many of us who played (however minor) a part in this revolution settled comfortably into the notion that selection acts on individuals—we expected to see adaptations in terms of the interests of individuals ("selfish organisms"). In this charac-