

Book reviews

Transgenic Animals in Agriculture. J. D. Murray, G. B. Anderson, A. M. Oberbauer and M. M. McGloghlin (eds). CAB International, Wallingford. 1999. Pp. 290. Price £55.00, hardback. ISBN 0 85199 293 5.

As a general rule, compendium volumes tend to be unsatisfactory. The quality of the articles is frequently uneven, coverage of the field may be incomplete or biased, and often some areas receive duplicate treatment. This is particularly true when the compilation consists of (or purports to be) the proceedings of a conference or symposium. The present volume is no exception. It deals with transgenic fish, birds and mammals, which is appropriate, but the articles vary from general reviews through recapitulation of the work of single laboratories to original papers. One or two of the original papers are of journal quality (and probably to be found already published in journals), while others are more cursory and yet others, for one reason or another, would be hard pushed to achieve journal publication. The book is not helped by a long 2-year time lapse since the conference was held. In a field that is moving quite rapidly, this unfortunately makes much of the content obsolete.

Attempts to generate commercially useful transgenic livestock have aimed at numerous different goals, which may be classified as follows: (i) the use of livestock as ‘bioreactors’, to produce large quantities of completely foreign proteins such as human pharmaceutical proteins; (ii) modification of a secreted animal product, such as milk or wool, to supply an existing or anticipated commercial market; (iii) more profound modification of metabolism to increase feed conversion efficiency, or to improve the quality of a product such as meat or to confer resistance to disease without excessive loss of feed efficiency.

Sadly, the results obtained so far have fallen very far short of expectation and have not been commensurate with the effort expended and costs incurred. What success there has been is in inverse proportion to the disturbance of the basic metabolism of the animal. Thus, the bioreactor field is at least promising, while transgenic livestock with improved carcass quality are as remote as ever. This might well have been foreseen. Unlike plants, which have a systemic plasticity that allows them to tolerate enormous insults so as to make the best of hostile environments, the physiology of animals, and particularly warm-blooded ones, is highly susceptible to perturbations. In transgenic livestock consequently, benefits are generally more than offset by concurrent deficits. This is part of the reason for the high rates of success obtained with transgenic plants, in contrast to the more or less zero success rate obtained with livestock.

This symposium volume presented an opportunity to air this and other fundamental problems, and to discuss answers to them. However, not until we reach Chapter 12 (by Kevin Ward and colleagues), following a litany of hopeful failures, is

there even a hint that something might be amiss. The final summing up (Chapter 18, by G. E. Seidel Jr) points unequivocally at the high failure rate, but seems to slide off into an optimism which is not explained. Chapter 17 briefly addresses a number of issues which have come to be lumped together as ‘ethical’: practical (environmental damage), humanitarian (will small farmers suffer?), sociological (consumerism), religious (thwarting God’s will) and superstitious (transgenic animals are unnatural). Issues of animal welfare are dealt with at greater length.

Considering that much of the material that it contains is obsolete or irrelevant, and that most of what is useful can already be found in libraries, the value of the book is at odds with its price.

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The Genetical Theory of Natural Selection — A Complete Variorum Edition. R. A. Fisher (edited by Henry Bennett). Oxford University Press, Oxford. 1999. Pp. 318. Price £25.00, hardback. ISBN 0 19 850440 3.

This is perhaps the most important book on evolutionary genetics ever written. Nearly every topic currently discussed is to be found in it, often dealt with in brief passages of condensed prose (it is gratifying to read that Fisher himself described Chapter 2 as ‘heavy’). The treatment is anchored in ecology, so that absolute rather than relative fitness is discussed, and the central theory is developed in spectacular and challenging directions. A new edition needs no justification.

At different times I have struggled with passages in the 1930 Oxford edition and the Dover edition of 1958, without taking note of the differences between them. In his foreword J. H. Bennett outlines the background to production of the first edition and the steps leading to the later one, which incorporated a variety of alterations. The variorum component identifies these for us. At first sight, at least, they reveal little of the author, given the developments in genetics and human affairs between the two editions. Many are grammatical improvements or replacement of archaic phraseology. Some of the larger ones are designed to make a passage clearer; for example, the discussion of genetic variance is extended as ‘Many readers may prefer a more explicit analytic treatment of the problem,...’. A new section on self-sterility alleles is included, ending with a swipe at Sewall Wright. Other changes which reflect contemporary issues are one minimizing the importance of drift in small populations, and another challenging the

argument that mutational load caused by atomic radiation presents a danger to humans. Experimental results are included to support the chapter on the evolution of dominance.

Almost two-fifths of the book is concerned with humans and society. This section tends to be overlooked by geneticists interested in Malthusian parameter, fundamental theorem or runaway process, but has received adverse attention in other quarters. Fisher the eugenicist can be read as a proponent of obnoxious doctrines which have cast a shadow over the twentieth century. When he had finished his first draft, he worried that the publishers did not know the extent of the section on humankind. They were happy to print it, however, and Fisher was to be disappointed by the lack of interest shown by reviewers. The 1958 edition contains this section almost unchanged ('formidable enough' replaces 'hardy and war-like' when discussing the Roman British, 'adequate' replaces 'generous' with respect to family allowances). The only significant insertion is a business-like statement of what is to be covered: the magnitude and heritability of variation in human fertility, evidence of association of fertility with class, and the theory of selective processes which could be responsible. 'On this theory it may seem that its destructive consequences are not incapable of rational control.' That statement, at least, is contentious. Fisher did not choose to review further research, by then more extensive and sometimes contradictory, and was evidently content with his treatment. Perhaps the choice of changes tells us more about the author than is at first apparent.

Illustrations of mimetic Lepidoptera from the original plate are reproduced on the dust jacket of this well-presented book, looking much fresher than they did in either of the preceding editions.

LAURENCE COOK

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Chromosome Structural Analysis — A Practical Guide. W. A. Bickmore (ed.). Oxford University Press, Oxford. 1999. Pp. 209. Price £29.95, paperback. ISBN 0 19 963698 2.

As we enter the postgenomics age, finding the answers to questions about the packaging, physical organization (and perhaps indexing), behaviour and accessibility of all of that sequenced DNA become more and more important. This volume, in the *Practical Approach Series* now consisting of more than 150 volumes, covers some of the key techniques used over the last 5 years to study the complex and hierarchical packaging of DNA and associated proteins. Advances in methods to study the functioning of the nucleus have been rapid and the volume presents a useful selection of these.

About half the chapters describe *in situ* hybridization to chromosomal targets of one form or another: Karl Ekwall and Janet Partridge discuss key techniques used for fission yeast chromosome analysis by the laboratories of Robin Allshire and M. Yanagida, and Jeff Craig introduces the purposes and techniques for *in situ* hybridization to vertebrate metaphase chromosomes. The following chapters, by Beth Sullivan and

Peter Warburton, and Joanna Bridger and Peter Lichter, add dynamics to this view by showing *in situ* methods applied to looking at chromosomes at all stages of the vertebrate cell cycle. Abby Dernburg takes us up a level to show the use of *in situ* hybridization to study the organization of whole mounts of tissue — *Drosophila*, *Caenorhabditis* and yeast.

Outside the *in situ* hybridization chapters, Dean Jackson details a range of extraction methods that enable nuclear substructure and contents to be analysed — or not, as evidenced by the rightly generous peppering of the chapter with 'attempted', 'presumed', 'thought', 'believed' and similar words! Electron imaging is out of fashion at the moment, but for 'chromosome structural analysis' the light microscope is just too limited in its resolution, whatever one might learn from ingenious probes and stains; so ultimately, visualization of what is there in the electron microscope will show chromosome structure, notwithstanding the formidable problems of artefact-free fixation, preparation and examination. Jason Swedlow describes the impressive methods pioneered by T. Hirano and Timothy Mitchison for *in vitro* assembly of *Xenopus* mitotic chromosomes. Two chapters concentrate on advanced molecular techniques to study protein–DNA interactions: Donald Macleod describes the ingenious ligation-mediated polymerase chain reaction method pioneered by Pfeifer and colleagues, while Giacomo Cavalli, Valerio Orlando and Renato Paro show how formaldehyde fixation can be used to investigate chromatin–protein interactions. The final chapter, by Christine Farr, is somewhat different from others in describing methods to generate human mini-chromosomes by seeding *de novo* telomere formation.

In the main, chapters in this volume give extensive details and tips on using techniques which are perforce described only briefly in the Materials and Methods section of primary papers. The standard presentation of protocols with Equipment and Reagents, Methods and footnotes is easy to follow. It is interesting to note chapter authors' personal comments about aspects of the technique that they consider critically important. Three of the *in situ* hybridization chapters discuss the feature of probe length (including impressive comparative pictures by Dernburg), when perhaps 3 years ago little mention would be made of this. But some factors I would have considered equally important — stringency and probe concentration, for example, are hardly mentioned, and methods of adjustment and calculation are not described.

None of the chapters covers work on plants, but more generally I felt authors could have tried to make techniques more accessible outside the specific system they are working with: the supposition being that future researchers will want to use the techniques in a heterologous system or in a different way. There is only one figure showing meiosis (too small to really see), and, given the impressive progress in plants, yeast and mammals with understanding of pairing and recombination using *in situ* hybridization and immunostaining in the last 5 years, I think that meiosis deserved a specialized chapter.

In a book like this, which includes only brief reviews of the science, I am always annoyed to find that titles of articles are not given in the citations. This adds a completely unnecessary step to one's search for the most relevant primary paper