

Gene Cloning. By D. M. GLOVER. London: Chapman & Hall. 1984. £15.00, U.S. \$29.95. ISBN 0412 26600 8.

This is the second edition of 'Genetic Engineering—Cloning DNA' which first appeared in 1980. Students have assured me that the first version was indispensable, so much so that copies disappeared mysteriously, never to return. The rate of progress in Genetic Engineering since 1980 has been astonishing. This is reflected in the difference in size between the two editions, the first a slim 77 pages, the second a more substantial 222 pages. This second edition is an excellent description of the theory and application of all the techniques necessary to clone a gene, study its organisation, mutate, reconstruct it and reintroduce it into cells and organisms for a variety of purposes. In 1980 no one had reintroduced genes into fruit flies, mice and plants. Not only has this been achieved but it has also been demonstrated that the reintroduced genes in 'transgenic' animals are subject to the normal developmental and cell-specific controls. Some of the recent advances in this area are summarised in the final chapter of the book together with a description of most of the new viral vector systems. This chapter supersedes the more speculative final chapter of the first edition which was entitled 'Approaches For Studying Expression in Eukaryotic Systems'. There is also a short new section on the molecular analysis of human diseases. There is no waffle in this book; all the information is presented with clarity and there is very little redundancy. There are eight chapters entitled (1) The principles of cloning DNA, (2) Recombination and mutagenesis of DNA *in vitro*, (3) Bacteriophage vectors, (4) Bacterial plasmid vectors, (5) Expression of cloned DNAs in *E. coli* plasmids, (6) The physical characterization of cloned DNA segments and their counterparts within chromosomes, (7) Gene cloning in fungi and plants and (8) Expression of cloned genes in animal cells.

A graduate technician in my laboratory has summarized my feelings, though from a more informed perspective – 'This is the best introductory text on recombinant DNA I have seen' or words to that effect. Several students in this Unit have already purchased copies. It is an ideal introductory text for undergraduates, graduate students and scientists from other disciplines who feel the need to become acquainted with the powerful tools of molecular biology.

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Genetics of Reproduction in Sheep. By R. B. LAND and D. W. ROBINSON. Sevenoaks, Kent: The Butterworth Group. 1984. £40.00 Hardcover. ISBN 407 00302 9.

This book is a symposium volume that is well described by its title. It is the outcome of a workshop held in Edinburgh in the summer of 1983, organized jointly by the Animal Breeding Research Organization and the U.S. Small Ruminant Collaborative Research Support Program. With one or two omissions noted below, everyone who matters in the area, and some who do not, seem to have been there. The result is 39 chapters by about twice as many authors. It is something of a tribute to the editing that you do not realize the range of the authorship without looking at the table of contents.

The breadth of coverage is enormous, with everything from the morphology of the genital organs of alpacas to some pretty demanding biometrics. I had not realized that alpacas were sheep, nor for that matter do I still. But as this is one of the more interesting

chapters in the book, we can be glad that alpacas, along with goats, were given honorary sheep status for the purpose. The chapters have been grouped into six sections, entitled in turn: I. Genetic variation and selection. II. The inheritance and effects of the Booroola gene. III. Genetic strategies for single genes. IV. Physiology of genetic variation. V. Physiological criteria of genetic merit. VI. Nutritional requirements and systems of husbandry. The last section is of course not genetical at all, but in a sense the value of the book depends on it. It is no earthly use producing triplets, quadruplets and more if you cannot keep them alive and make them grow.

Many geneticists might be astonished by how much is known about the genetics of reproduction in sheep and by how much work is being done on it. However, this is a book for sheep people rather than for professional geneticists. But should a *Drosophila* or a *Neurospora* or, I was going to say, a human research worker chance upon it on a library shelf, they might do worse than take a few moments to look at it. They might not learn much about what is happening at the cutting edge of new genetical knowledge, but they would get a flavour of what the game is all about. Many of the advances in animal improvement from the application of genetics are still likely to come from unfashionable activities like quantitative and physiological genetics. These areas are about as relevant in practice as ever, as those concerned with the teaching of genetics may care to note. There is a great deal in the book on gene action, endocrine levels, receptors, how they may be blocked, and the like. All this promises that one of these days, twins or triplets may be produced to order, as required, under field conditions. In the meantime, various selection or crossing programmes have their part to play, partly to produce practical results but partly also to generate new research material.

Into the middle of all this has now been cast a single gene that in the heterozygote roughly doubles the lambing rate. It is called the Booroola gene, and was discovered in Australia – where else, with a name like that? Some pedants still question whether in fact it is a single gene, but even ignoring acceptable segregation on a given system of classification, it is impossible to think what else it might be, given its history. It had been present for many years in a prolific commercial flock, where the selection for prolificacy was all on the ewes; rams were always bought in from other nonprolific flocks, without reference to number born. To maintain a high lambing rate on this system is just about compatible with the segregation of a single gene. The gene has now been transferred to other flocks and other breeds, and whole sections of this volume reflect its interest to research workers in different parts of the world. Even those who do not have the gene on their research stations, or did not then, were able to write copiously about what they would do with it if they had it. There is a very illuminating multi-authored chapter on the endocrinology of the Booroola gene, illuminating in the sense that we now know better what we are confused about. There is little doubt that FSH levels are elevated; there is a suspicion that the secretion of ovarian inhibin is reduced in Booroolas, which reduce the negative feedback to the pituitary; there is the possibility that this may be related to FSH receptors in the ovary and, more vaguely still, that this may affect the number of follicles which acquire LH receptors. To be honest, I get out of my depth, but I can just about see where more work is needed. We seem to be some way yet from identifying the gene product. Once that is done, someone will no doubt fish out the gene and let the molecular biologist get to work on it. Perhaps the next volume of this kind, or the one after, will have material of more direct interest to the mainstream readership of *Genetical Research*.

In the meantime, this volume will be invaluable to those who work on the genetics of reproduction in sheep and other mammals. There is a wealth of information here that is up-to-date, readable and, as far as I can judge, authoritative. It is also comprehensive as far as it goes, if that expression makes any sense. One omission is really quite extraordinary. It has been claimed that the most prolific breed of sheep in the world is the Cambridge, and as far as I know, this claim has never been seriously challenged. It

is to be found at a few research establishments and a few farms scattered throughout the U.K. It has been developed over the last 25 years or so, all the people concerned with the venture are alive and active, and publications about it go back to at least 1969. It now seems that it may have a single gene which increases litter size, and which closely mimics the Booroola gene if it is not the same one. The breed was developed by screening diverse populations which, if success is anything to go by, is worth all the other genetic manipulations put together. Yet, in the index to this volume, there are only two references to Cambridge sheep, though they missed at least one (page 16). One reference is the most fleeting possible, and merely includes the Cambridge in a whole list of prolific sheep. The other describes the use of the Cambridge in an experiment on rearing multiple lambs at pasture. Otherwise, the breed and the work on it is totally ignored. At least the method of selection used to develop it might have been more thoroughly examined, along with other possible methods. More serious perhaps is the wider neglect of this material for research. The Cambridge may not be everyone's idea of a good commercial breed, mostly because it has more lambs per ewe than the ordinary flockmaster can manage. But I find it hard to imagine that research workers can get excited about differences of 0.15 of a lamb when the Cambridge breed has resulted in differences of several fold. The omission is hard to explain. I can scarcely believe it was from ignorance, and I am loath to believe it was from prejudice. I also wondered whether I should say something about the lack of reference to the New Zealand success story with co-operative breeding schemes to improve prolificacy. But that puts me in danger of betraying a prejudice of my own, so I decided it was safer not to mention the point.

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Genetic Recombination. Edited by JOHN H. WILSON. Berkshire: Addison-Wesley. 1985. 517 pp. £29.95. ISBN 0 8053 9790 6.

This book has a misleading title. It is not a new volume designed to bring us up-to-date on the current state of the art and arguments concerning all aspects of genetic recombination, as one might expect, but something quite different: a reprinting of ten reviews from *Annual Reviews of Genetics*, four from *Annual Reviews of Biochemistry* and one from *Annual Reviews of Plant Physiology*, published originally over the years 1975–1983 and all devoted to particular aspects of genetic recombination. The articles are grouped under the headings MEIOTIC RECOMBINATION (six reviews), MITOTIC RECOMBINATION (four reviews) and BACTERIAL RECOMBINATION (five reviews which include articles on the two phages T4 and P1 but omit lambda).

These reviews are generally very well written, were more than up-to-date at the time of writing since unpublished work was described wherever possible, and they retain more than a historical interest in view of the importance of the subject. So it would be valuable for anyone with a particular interest in genetic recombination to have them all on the shelf together. However, the articles all come from volumes which should be readily accessible in most libraries used by potential readers, and it is questionable whether such duplication is really worth while. Potential customers should, therefore, be quite sure what they are buying before laying out £29.95. It is also worth remarking that the complexities of the processes involved in genetic recombination make for heavy reading, which will no doubt become easier when they are better understood.

This book is one of a new series called the Annual Reviews Special Collections Program, based on the Annual Reviews volumes so that no other review sources such as *Advances in Genetics* or *Microbiological Reviews* are tapped. It will be interesting to see what other