

rather than molecular biology *per se*'. Given the need to limit the book to a meaningful size and keep the discussions focussed, and also given that the bulk of parasitology research using a molecular genetic approach in the 1980s was linked mainly to the immunological characterisation of parasitic protozoa in the search for vaccines or, in the case of trypanosomes, to novel molecular biology processes such as *trans*-splicing and RNA editing, this is perhaps understandable. However, recently, recombinant DNA techniques and the power of molecular genetics have greatly aided our understanding of classical biochemical problems such as those discussed in this book. Besides the obvious value of gene cloning and recombinant gene expression to the study of particular proteins, for which several examples are described in this book, other 'molecular genetics' approaches have been valuable. For example, the genetic analysis of progeny from a genetic cross has yielded new information on chloroquine resistance in malaria and may lead to a better understanding of this drug's mode of action. Furthermore, the development of a transformation system by which foreign DNA can be targeted to specific regions of trypanosomatid genomes has recently been reported. This could have a huge impact on how we study the operation of biochemical pathways within these organisms.

As stated by the editors, we appear to be moving into an era when the division of protozoologists into biochemists' and 'molecular biologists' is becoming increasingly blurred. It is only through a partnership of people versed in the whole range of scientific techniques available that we will be able to better understand the biology of a particular organism and, if necessary, devise methods of controlling it. I very much hope that there will be future editions of this extremely worthwhile book and that these editions will reflect a synthesis of molecular genetic and biochemical approaches to the study of parasitic protozoa. It is likely also that parasites not mentioned in this volume will find their way into such editions. These might well include the poultry parasite *Eimeria* and the tropical cattle parasite *Theileria* which are now being actively investigated. In addition more recent organisms of biochemical study, such as *Pneumocystis*, *Toxoplasma* and *Cryptosporidia* which are associated with opportunistic infections in AIDS patients, should also have their place.

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Animal Applications of Research in Mammalian Development. Edited by R. A. PEDERSEN, A. McLAREN and N. L. FIRST. Cold Spring Harbor Laboratory Press. 1991. 334 pages. \$44. ISBN 0 87969 333 9.

During the past 50 years there has been a continuing increase in the research effort directed toward the

recovery, manipulation and storage of mammalian embryos. Initially the need was to be able to recover and transfer embryos, but more recently the emphasis has moved on to revolutionary techniques that introduce genetic changes or produce several copies of the embryo by nuclear transfer. This volume presents a review of the present situation with regard to 8 different topics. The eight specialist contributions are preceded by a general introduction which places the other chapters into context. Although this book is associated with a meeting that took place in October 1989 the chapters were apparently completed during the latter half of 1990.

This volume is one of the series in Current Communications In Cell and Molecular Biology which examine 'topics on which the impact of the techniques and concepts of molecular and cell biology is particularly evident'. In this volume the intention was to review 'cellular and molecular approaches to gametogenesis, embryogenesis, and maternal-fetal interactions in agriculturally important animals'. There is considerable variation in the nature of the chapters and this is reflected in their length, which ranges from 17 to 59 pages (on stem cells and oocytes, respectively). In some chapters there is an evident attempt to review information from a great variety of species, while in others the comparisons are limited.

Although it is now possible to promote the maturation of the oocytes of several species *in vitro*, much remains to be learned of the mechanisms that maintain oocytes in their resting state within the follicle until the final stimulus to mature shortly before ovulation. There is a particularly interesting and comprehensive review of these subjects by Racowsky, which summarises the observations in many different species and contrasts different models that are presently under investigation. Attention is also drawn to the recent studies of primordial follicle culture.

It is also very useful to see a comparative review of the origins of the cell lineages, by Cruz and Pedersen. After summarising embryogenesis in the mouse there is a description of the sequence of events from cleavage through compaction, the formation and elongation of the blastocyst to gastrulation and implantation in domestic species, contrasted with observations in insectivores and metatherians.

Prather and Robl provide an excellent summary of the two procedures of splitting embryos and nuclear transfer, the first of which is well established, but has only limited potential while the other has far greater apparent potential which has yet to be realised. Much remains to be learned of mechanisms that can be harnessed to reprogramme the nuclei of differentiated cells, activate recipient oocytes and control the early development of reconstituted embryos, and these issues are raised in this chapter.

There is an excellent account of the method and potential applications of gene transfer by direct

injection in livestock by Ebert and Selgarth in which they place this approach into the context of conventional breeding schemes. There is no discussion of the possibility of gene targeting in stem cells. In a later chapter there is a description of embryonic stem cells in mice and a rather cursory introduction to gene targeting, but little discussion of the nature of such cells nor of the possible reasons for the present failure to establish embryonic stem cell lines from livestock species.

Perhaps the most expensive biological experiment ever to be conducted is now being carried out to map the genome in several livestock species. Only in this way will it be established how many genes of major effect influence traits of economic importance. These may then be exploited either by gene manipulation or marker assisted selection. This complex area of molecular biology and conventional genetics is well described by Georges. His concluding section discusses the potential value of taking oocytes from the fetal gonad for maturation, fertilisation and transfer to recipients, so reducing the generation interval significantly while also permitting the use of techniques of selection or transfer of genes. While this approach seems ambitious at present it suggests that there are many potential applications of these techniques that remain to be considered.

There are a number of areas that may be considered important that are not reviewed. I am surprised that there is no discussion on embryo freezing, as embryo freezing is already contributing to the use of embryo transfer and the large-scale application of embryo transfer procedures will depend upon being able to store embryos in such a way that they can be thawed and transferred on farm immediately before transfer, in much the same way that semen is frozen and thawed at present. There is, however, a detailed discussion of recent research on oocyte cryopreservation. Similarly, the only aspect of embryo culture to be considered is the influence of the ionic environment upon development. There are no chapters on capacitation of spermatazoa or *in vitro* fertilization, upon the separation of X- and Y-bearing sperm or on the determination of the sex of embryos, despite the fact that these are all areas of active research.

Although this area of biology is extremely important there have been very few reviews of the entire area and this volume meets a clear need. It will provide an invaluable source of information for those working in related areas and an excellent introduction to the subject for honours and post-graduate students. It should be found in the libraries of genetic, agricultural and veterinary departments and on the shelves of many research workers.

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Statistical Genetics. By PREM NARAIN. Wiley New Delhi, India. xv + 599 pages. £26.

This book gives a very comprehensive review of statistical genetics. After an introductory chapter on Mendelian genetics the rest of the book is devoted to the statistical principles of population genetics, quantitative genetics, selection and cross-breeding with particular emphasis on animal and plant breeding. No other book covers such extensive ground: it covers most of the material in Kempthorne and some of that in Crow and Kimura, some of Falconer, all at the bargain price of £26.

Topics from population genetics include analysis of segregation and linkage, random mating, inbreeding and effects of finite population size. I found the presentation of the now neglected area of path coefficients informative and the chapter on finite population size made instructive use of conditional diffusion equations.

In quantitative genetics there is a comprehensive discussion of genetic components of variation between relatives and heritability. Five chapters consider selection in detail, including individual, family and combined selection, selection limits and selection for improving several characters. There is too much emphasis in this chapter on the use of auxiliary traits. A long chapter on crossbreeding, in my opinion, is more interesting because it builds on the author's extensive experience in cross-breeding schemes in India. Two chapters consider the analysis and construction of diallel and partial diallel crosses.

The author says he planned writing the book in 1979, and the book does not do full justice to recent work, less than 5% of the references are to work in the eighties. For example the power and unification offered by Best Linear Unbiased Prediction with individual animal models is now well recognised, but the discussion in this book is only six pages with concentration on sire evaluation.

However, the book gives a relatively inexpensive introduction to the classical principles of statistical genetics.

References

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