

acids chemistry would normally have been spread over 10 volumes of the journal *Nucleic Acids Research*, so we are provided with a distillation of major topics and literature references. The book is a celebration of the quantity and quality of Japanese academic research in this important field (more than 90% of the contributions are from academic institutions). My overall impression is one of admiration and respect and, speaking as a British scientist, not a little envy.

Papers in this volume span a very wide range of interests, from the chemical synthesis of potential antiviral agents to advances in the preparation of DNA oligonucleotides. There are also papers on molecular cloning and suggested models for prebiotic synthesis of nucleic acids. Physical techniques such as NMR, Raman Spectroscopy, Circular Dichroism and Differential Scanning Calorimetry also feature. It must be emphasized that this is a collected volume of research publications a number of which would not be acceptable in the more standard scientific journals, as is inevitably the case for symposium reports.

The book provides a window into what is happening in nucleic acids research in Japan and as a researcher in the field I consider the book to be well worth reading. The price is too high, particularly considering the quality of the reproduction, the paperback cover and the small format. Despite these drawbacks I would have to recommend its purchase by any library already taking nucleic acids research.

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In vitro Fertilisation – Past, Present and Future. Edited by S. FISHEL and E. M. SYMMONDS. IRL Press Ltd. 1986. 276 pages. £17.50 US \$32.00 (soft), £27.50 US \$50.00 (hard). ISBN 0 947946 50 0 (soft), 0 947946 95 0 (hard).

Arthur Koestler has made the point in his 'Act of Creation', that very rarely if ever do scientific discoveries and innovations arise *de novo*. They almost always have their origins in earlier work. This is also true of *in vitro* fertilization (IVF) as Fishel clearly shows in his fascinating historical introduction to this book which represents the edited views of an international group of medical scientists, philosophers, theologians, ethicists and lawyers. It was only in 1978 that the work of Edwards and Steptoe led to the birth of the first baby conceived *in vitro*, yet within seven years no less than 117 IVF clinics had been established throughout the world. This is understandable since it provided a valuable method for overcoming the infertility experienced by many couples.

IVF is here considered from various points of view: the evaluation of infertile couples, techniques of oocyte recovery using laparoscopy and more recently

ultrasound, embryo replacement, and the results of IVF. The laboratory techniques involved are discussed in detail including the growth of the early conceptus *in vitro*. The importance of careful and sensitive counselling of couples undergoing IVF is emphasized. The current status of the Warnock report and various ethical and legal matters are given consideration. Finally, Leo Abse discusses the political issues raised by IVF and similar works.

Though IVF is now a well established and widely used technique, it becomes clear in reading this text that many fundamental problems still need to be resolved. There is ignorance regarding the optimal conditions for normal growth of the early conceptus *in vitro*. The best stage of development at which to replace a human embryo is unknown. For various reasons it has proved difficult to evaluate the number and quality of pregnancies following IVF. And though it seems likely that the incidence of malformed children born after IVF is no greater than in the general population, this has yet to be clearly established. There is therefore much scope for research in this field.

Apart from the treatment of infertility, IVF offers a new approach to studying the causes of some forms of infertility and, rather paradoxically, might lead to the development of novel methods of contraception. Furthermore, the study of cultured embryos could not only throw more light on early human development but might also lead to a better understanding of how certain congenital malformations arise. But such studies, and some would add IVF itself, raise many ethical problems. For example, is it right to discard or experiment on fertilized eggs that exceed those required for replacement? Might such studies one day be unacceptably extended beyond the 'pre-embryo' stage (at about 16 days after fertilization), and how can such work be effectively regulated? Leo Abse argues from his many years as an experienced parliamentarian, that decisions should not be made hastily. That we need first to be educated and well informed about the facts and then given time to explore our fears and anxieties. Only in this way can we avoid making precipitate and ill-conceived judgements. This well-edited and well-written book will help to provide the facts about this important subject.

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Cold Spring Harbor Symposia on Quantitative Biology. Volume L. Molecular Biology of Development. Cold Spring Harbor Laboratory. 1986. 920 pages. Cloth \$140. ISBN 0 87969 050 X. Paper \$70. ISBN 0 87969 051 8.

The devotion of the 50th CSH Symposium to Developmental Biology is very appropriate for a field

which, though never neglected, has recently exploded with a wealth of new data which help to explain the underlying mechanisms controlling development. There are large numbers of molecular techniques which have become increasingly sophisticated such that real progress has been made.

Much of developmental genetics described the abnormal phenotypes associated with mutations and quite a lot could be deduced about the mode of action of the corresponding wild-type gene. This progressed to advanced levels in only a few cases such as the organization and function of the bithorax complex which controls segmentation in *Drosophila* analysed by E. Lewis and colleagues for many years. In most cases, however, understanding how the mutated gene led to an abnormal phenotype was extremely difficult – especially given the pleiotropic effects of many mutations acting early in embryogenesis. Now we can clone these genes, both in the wild-type and mutated forms, by a variety of techniques and analyse the products they encode.

Having described their spacial and temporal transcription and translation, the regulation of these genes can be analysed by mutating upstream regulatory sequences and re-introducing these modified genes into organisms to see how their function is altered, thus dramatically increasing our understanding of how genes control development and how gene expression is regulated. The next few years will continue to bring a wealth of this information, hopefully added to by using site-directed mutagenesis to alter the protein products of genes in specific ways to see how this affects development, and thus dissect even further the molecular mechanisms involved in a way analogous to biochemists altering the active sites of enzymes to analyse the precise basis of enzyme activity.

The history and scope of the Symposium along with the hopes for the future are well covered in an introductory paper by J. Gurdon. This sets the scene well for the sections which follow. The final summing up by G. Rubin will help to guide the reader to the most interesting sections, and we would suggest reading these two contributions before delving into the research papers.

The book is divided into 13 sections and no individual is likely to attempt to read it all. The subsequent comments on the sections are thus a group effort with each of us concentrating on some areas in which we are expert and some which fall well outside our experience. Clearly, each individual person will find different contributions interesting and we can only hope to guide people through what is on offer by summarizing the sections of the book:

Nuclear/Cytoplasmic Interactions in Early Development. This comprises 10 papers concerning mouse, *Xenopus*, nematodes, *Drosophila* and sea urchins. These include analysis of determination, the distribution of RNA and specific gene products, cytoplasmic organization and the activation of the zygotic genome.

Lineage and Segmentation/Pattern Formation. The seven papers in this section were devoted to *Drosophila* with only one divergence to *Caenorhabditis elegans*. It was a little surprising to find no other organisms here such as *Xenopus*. Most of the research describes the isolation of mutants and the cloning of various genes involved in the establishment of polarity and segmentation in the embryo.

Homoeotic Mutants. The homeotic genes control segment identity in *Drosophila* and the 10 papers continue logically from the last sections, although the one on *dorsal* probably belongs in the previous section. There is a good mix of genetic analysis and molecular studies. Although all the papers have some background information, we think that for the uninitiated an overview of *Drosophila* embryogenesis, the sequence of events establishing polarity, segment number and segment identity and the kinds of genes involved should have been included to guide the reader through this section and some of the earlier papers.

Homoeo Boxes. The finding of a small conserved sequence of DNA (the homoeo box) in the coding region of many of the homoeotic genes and their isolation from other organisms is very exciting and may provide real insight into how genes control development. The introductory paper by Gehring sets the scene well and seven papers follow, covering the properties of the protein products of some of these homoeo box-containing genes and the organization and expression of some of these genes in *Xenopus* and mammalian systems including humans.

Tissues Specificity/Position Effects. This is a rather mixed bag of seven contributions covering transposable elements and lineage-specific gene expression in maize, nematodes, sea urchins and *Drosophila*. Some of the papers concentrate on the transposable elements and control of transposition whilst others use P-element-mediated transposition to study the regulation of expression of genes introduced into the organism with the transposon.

Expression of Genes Introduced into Transgenic Mice. Along with seven papers on mice, this section contains, rather surprisingly from the title, two nice reports on plants. A range of gene constructs have been injected into the germline of mice and the studies not only describe the gene expression resulting from the construct but try to use them to understand developmental processes in several cases. The necessary background information to make the results accessible to the non-expert was present in most contributions.

Induced Developmental Defects. Three of the papers in this section continue the theme of using transgenic mice and produced developmental mutations by either injecting DNA into the pronucleus or by viral infection of preimplantation embryos. These allow cloning of the induced mutations since the mutated genes are tagged with the introduced gene. There is also one paper on tobacco which demonstrates a good

method for obtaining genes involved in development. The *Drosophila* story is a well-known one.

Control of Gene Expression. In this *Drosophila*-dominated section, the regulation of gene expression has mostly analysed the DNA sequences needed for correct transcription. It is interesting that the regulation of moth chorion genes could be studied after introduction into *Drosophila*. There are also contributions on yeast, the 5s genes of *Xenopus*, nodule formation in plants, and one on *Bacillus* which is a little lost in an otherwise eukaryotic section.

Sex Determination. Seven contributions cover the genetics of sex determination and related problems such as dosage compensation. *Caenorhabditis*, *Drosophila*, mice and yeast are obvious inclusions although the reader might wonder whether λ , though an interesting model for studying development, fits with sex-determination. More contributions on higher organisms, in particular mammalian systems, would have been useful.

Cell Cycle Effects. These six papers cover yeast, fission yeast, *Xenopus* and sea urchin. The genetic dissection of yeast division was very innovative. In general the other papers were continuations of long-term projects with no obviously dramatic progress.

Pluripotent Cells/Oncogenes. This is a fairly extensive section of 12 papers covering viruses and other vectors introduced into mice studies of *Teratocarcinoma* cells and oncogenes and related sequences in various organisms.

Cellular Differentiation. Six of the eight papers are on *Dictyostelium*, which is a good model system for analysing the decision-making process for cell differentiation and cell-cell interactions. The other contributions were on *Myxococcus* and *Caulobacter*; thus this section concentrates on simple organisms. Super-

ficially it is a little surprising that there was not a similar session on higher organisms, but most of the current work in more complex eucaryotes does seem to be concentrating on the regulation of gene expression during development rather than on the ultimate process of differentiation.

Developmental Neurobiology. The coverage of this interesting area was a little disappointing with three papers on *Drosophila*, one on rat and one on the chick, although the latter two failed to mention what organism they were working on until some way into the paper.

Much of the information in this book has been published now, so it is not critical to own it to gain access to data. However, it is an extremely valuable starting point for any topic in molecular development since the papers generally have more background than is found in a journal; and thus they provide a good method for picking out key papers from the past and guide people into what is likely to be appearing in the literature in the near future. We think that every laboratory working on the molecular basis of development will want a copy of this book – the sheer magnitude of its coverage would probably be sufficient but most of the papers are also well-written and interesting. It will also be a valuable text book for advanced undergraduates and Ph.D. students.

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