
Book Reviews

Genetically Engineered Organisms Benefits and Risks.

By J. R. S. FINCHAM and J. R. RAVETZ, in collaboration with a working party of the Council for Science and Society. Open University Press, Buckingham MK18 1XW, UK. 1991. 158 pages. Hardback £27.50, ISBN 0 335 096190; paperback £8.99, ISBN 0 335 09618 2.

This is an excellent little book on the controversial issues of genetic engineering and its applications, written by a group of experts who (I think) have no axe to grind, since they are not involved in promoting engineered products nor at war with their usage under careful control.

After two introductory chapters aimed at readers not trained in molecular genetics, the book takes the various areas of application and summarizes recent progress, prospects and possible dangers, in the next six chapters, and finally considers risk assessment and managing the uncertainties of risk assessment. Some key references are found at the end of each chapter, and a useful glossary and index follow.

The six chapters on specific areas of application cover genetic engineering of organisms in industry, of microorganisms for use in agriculture, of agricultural plants, of animals, vaccines obtained by genetic engineering, and applications to the human genome. These chapters show the wide range of projects on which progress is being sought, and indicate the methods applied and the major problems the molecular geneticist comes up against. Each chapter also includes a useful discussion of ecological considerations and potential risks.

To take a few of the many examples, organisms in industry can produce hormones and growth factors, antibodies and antibody subunits, antibiotics, food additives and dietary supplements. Microorganisms may be modified to improve rumen bacteria and silage, to control insect pests, reduce frost damage and perhaps to revolutionize the disposal of farm wastes. Plant breeders have a great variety of material to work on, with prospects of transferring genes for disease resistance, resistance to insect pests and to herbicides in crop plants, and also converting plants to entirely new uses and extending the range of plant hybridization. Modified viruses as vectors for transferring useful genes, once they have been identified, play an

important role in many of these procedures, and this raises problems of possible dangers which need close attention.

The book will be found instructive by anyone with even a small knowledge of biology, and it deserves very wide dispersal, which is made fairly easy by the low price of the paperback edition. I imagine it will contain much useful information even for the well-trained geneticists, and it should form an excellent starting point for those who want to get a better idea of what is going on in the mysterious world of genetic engineering and its commercial applications. In reading it, one must of course bear in mind that there is a great deal of effort being put into all those projects which seem to have financial prospects, so this book, like all others on genetic engineering, is being rapidly left behind by real life. But it will be useful for some time both for those wanting to catch up on progress and for those who remain suspicious of the disasters which over-enthusiastic commercial applications could lead to.

ERIC REEVE
Institute of Animal Genetics
University of Edinburgh

From Gene to Animal. By D. DE POMERAI. Cambridge University Press, Cambridge. 1990. 417 pages, ill., index. Hardback £45.00, ISBN 0 521 38192 4; paperback £14.95, ISBN 0 521 38856 2.

The first edition of this textbook was put together in a hurry, and it was criticized for being superficial and for lacking balance. This second edition is essentially a new book, which has benefited from some of the comments on that trial run. It is a sort of graft of Davidson's *Gene Activity in Early Development* on to Wilkin's *Genetic Analysis of Animal Development*, but updated and with a greater emphasis on the molecular aspects of the subject. That being so, the book's immediate value lies in its topicality.

It starts with a very condensed summary of what every embryologist should know about molecular biochemistry. This is so advanced that the student is assumed to have done a full course – and presumably will use the summary as a refresher – and if not, he/she will have to go elsewhere. Similarly, the molecular biologist is expected to know at least some

rudiments of embryology: on page 5 he will find that *determination* (not defined for another 90 pages) may depend on DNase 1-hypersensitive sites or possibly on DNA methylation. Other similar examples linking specific molecular mechanisms with particular embryological phenomena suggest the author has a well-defined group of students in mind; those already familiar with the basics of molecular embryology and able to separate speculation from fact.

We have already noted that the book is up to date, for among its 1300 references are some from early 1990. But this modernity has a price, since each topic tends to be treated as if it were a journal review waiting for the latest report to be spliced into it. Teachers will have to decide if the merit of having these facts outweighs the disadvantage that much has still to be digested before the text can be comprehensible to a student reading on his own. This is a general criticism which will not be repeated as we note below the topics covered.

The Introduction flows naturally into molecular descriptions of ovogenesis, of maternal mRNAs and proteins and their cytoplasmic localization, and thence to the description of mosaic and regulative systems. This, and the description of the molecular concomitants of later differentiation, are clearly outlined, though they are poorly supported by 'blackboard sketches' for diagrams. Systems open to experimental analysis start with three general vertebrate examples: myogenesis, which is used to contrast determination and differentiation; erythroid differentiation, to illustrate the function of gene organization for globin switching during development; and the hormonal regulation of vitellogenesis and of egg-white synthesis. These are all well-studied systems, which suggest some of the possible general mechanisms of gene expression during deuterostome development. All this is, surprisingly, in preparation for the study of the geneticists' two invertebrates, *Caenorhabditis* and *Drosophila*, which is the core of the book, occupying about two-thirds of its pages.

Caenorhabditis and *Drosophila* both lay mosaic eggs, though of very different sorts. The invariant lineage of the 550 cells of the *Caenorhabditis* embryo implies the establishment of cell fates by the segregation of maternally transmitted determinants, and laser ablation of particular cells shows that none can be replaced by the regulation of others, except rarely. The work which takes the first steps in exploring this cell-by-cell determination, the subsequent role of the embryonic genotype in establishing the nervous system and somatic sex determination are all carefully described, and similarities to *Drosophila* genes are emphasized.

Since the first mitoses of the *Drosophila* egg create a syncytial blastoderm of nuclei of equal potential, maternal genes must establish differences in the egg cortex which activate gene cascades to create the metameric segmentation of the larva and the charac-

teristic segment differences. This is a regularly reviewed, continuously growing subject, but the merit of this text is that it puts the details in context, and it qualifies as a chosen review for students to read. It finishes with the homeotic genes, and explains how the homeobox sequences have been used to probe for similar, related sequences in the mouse and *Xenopus*, in particular. Unfortunately, this section is so overloaded with facts that it is difficult to see the wood for the trees.

Finally, there is a review of sex determination in *Drosophila*, and this again is an actively pursued and often-reviewed subject. In this case there is no doubt that the latest review (Slee and Bownes (1990), *Q. Rev. Biol.* **95**, 175–204) is the text of choice, and not just because it is more comprehensive and approaches the problem, neglected by de Pomerai, of the expression of tissue-specific products, in this case of the yolk proteins made by the fat body and follicle cells.

This book would have been better if the CUP had insisted on more and better illustrations: ten pages without an enlightening diagram makes for dreary reading. But its major defects are two: the historical contexts of discoveries are ignored – the student would never guess that the *Drosophila* sex gene *transformer* was discovered in 1945 or the homeotic *Antennapedia* in 1949 – and there is no appreciation of the genetic logic which has brought us to the point of understanding what these, and other, genes do. The price of being factually up to the minute is that the book will not 'provoke reflection, stimulate questions, and even raise objections and criticism'. *Genes and Embryos* (1989), by Glover and Hames (IRL) will better fit that bill.

JAMES SANG

Biology, School, Sussex University

Genetics and Biology of Alcoholism, Banbury Report No. 33. Edited by C. ROBERT CLONINGER and HENRY BEGLEITER. Cold Spring Harbor Laboratory Press, New York. 1990.

Thomas Clouston, in the 1904 edition of his *Clinical Lectures on Mental Diseases*, introduces us to an alcoholic patient with the following words: I shall now show you a typical dipsomaniac, F.B. His mother has been melancholic at one time, and her family was a neurotic [one]. We no longer issue diagnoses of dipsomania or melancholia, and even neurosis is falling into disuse, but study after study since then has shown that alcoholism tends to be a familial disorder and that at least some of the propensity to alcoholism is under genetic control. A great deal is known of the social, medical and economic harm generated by alcohol dependence itself, but our understanding of the factors, genetic and otherwise, that cause some people to become alcoholics in the first place and others not is both lacking and confused. It is with such issues that this volume of the Banbury