Book reviews

Molecular Biotechnology: Principles and Applications of Recombinant DNA. Bernard R. Glick and Jack J. Pasternak. American Society for Microbiology, Washington DC. 1994. Pp. 500. Price £35.00, paperback. ISBN 1 55581 071 3.

This book was a thorough pleasure to review and will be a welcomed arrival both to those involved in teaching molecular biotechnology courses at the undergraduate level and those wishing to gain a broader understanding. The text is divided into four sections, each of which has a concise, easily readable, summary of what can be expected in the following chapters and its relevance. The layout makes it easy to read, each chapter has a clear indication of content and ends with a short summary, well chosen references and a series of review questions relevant to the text. A very useful glossary is also incorporated.

Section 1 (Chapter 1) 'Fundamentals of molecular biotechnology', deals with the development of biotechnology, recombinant DNA technology, fundamental procedures including chemical synthesis of DNA, DNA sequencing, polymerase chain reaction (PCR) and monoclonal antibodies. Some discussion on the instability of mRNA would have been desirable as this is often not appreciated by students. The manipulation of gene expression in prokaryotes is well covered, but I was a bit surprised that the use of the pET overexpression system was not mentioned. Protein stability, and its improvement by altering amino acids is well exemplified.

Heterologous protein production in eukaryotic cells is well discussed, with good examples from a number of different studies which makes the reading enjoyable. Also, from the teaching perspective, the examples are invaluable. The chapter on 'Directed mutagenesis and protein engineering' clearly and succinctly describes the approaches available.

Section II is concerned with microbial systems and contains 7 chapters which describe individual cases of specific cDNA isolation and why each was an important target. Interferon, growth hormone, restriction enzymes, ascorbic acid production and indigo are worked examples of strategies used. Refreshingly, in this chapter, and in numerous other places in the book, the value of the products is quoted. This is a question one is increasingly asked by students and Government funding agencies. I found the chapter on molecular diagnostics enjoyable. It clearly showed good working examples of (a) PCR based diagnosis of sickle cell anaemia, (b) PCR based oligonucleotide ligation assay, which could be used to pick up single base mutations using a combination of streptavidin and digoxigenin labelled primers, and (c) a procedure for monitoring multiple mutations in a single assay by PCR. Vaccines and therapeutic agents are well exemplified,

including foot and mouth and strategies for HIV therapeutics. Bioremediation and biomass utilization is well dealt with, along with mechanisms of obtaining plant growth promoting bacteria by means of modulating hydrogenase, nitrogenase and nodulation genes. The means of isolating these interesting genes by complementation is well discussed. The chapters on microbial insecticides cover *Bacillus thuringiensis* toxin, its mode of action, gene isolation and genetic engineering as well as Baculovirus as biological control agents. Interesting facts such as the scale of its use are given. This section is rounded off by a short but highly readable chapter on large scale production of proteins from recombinant organisms, which includes consideration of design and maximizing efficiency for individual processes. In all, the first two chapters constitute 326 pages of the 450 pages of primary text.

Section III is concerned with eukaryotic systems, and has chapters dealing with genetic engineering of plants, development and use of transgenic animals, and isolation of human genes. It culminates with a chapter on human somatic gene therapy which contains good examples and clearly points out the areas for concern.

In comparison to the other part of the book, I was a little disappointed by the lack of clear and detailed examples in the plant and animal area. This was probably brought about by the high standard set earlier on in the book, with clear illustrations and all the background in place, but sadly missing here. This is the only real shortcoming of the book and an area which I hope the authors will try to expand. It is, however, not a dramatic omission but rather a judgement of theirs on the availability of space, coupled with a personal interest of mine in animal and plant biotechnology. The final section has two chapters relating to regulation and patenting issues.

Overall the book is well written, easy to read and well illustrated. The examples give excitement to the entire topic and I would highly recommend it. At its price it is packed full of great information and it represents a text that I have wanted for my students for some time. Buy it.

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Understanding Ageing. Robin Holliday. Cambridge University Press, Cambridge. 1995. Pp. 207. Price £14.95, paperback. ISBN 0 521 47802 2.

Ageing must be one of the most inchoate of subjects in that it encompasses hugely diverse types of study and

elicits mostly untestable hypotheses — but can not be cured. Comparing this slender volume on ageing with Finch's 922 page tome, *Longevity, Senescence and the Genome*, one finds the latter heavy with data and the former with theories, or more correctly, with one theory, Holliday's book is portable as well as very readable, though one should issue a caution: wrinklies seeking remedies will find little cheer. Life-span extension has been achieved (in mice and rats) only by restriction of diet — a measure that few humans would voluntarily take, especially the young, to whom old age seems so remote. Indeed, perhaps to redress the rather over-optimistic choice of book title, *Understanding Ageing*, the author points out at the very end that the elixir of life is presently unavailable. Most of us, though, would prefer a Dorian Gray-type life: prolongation of youth (and a speedy demise) rather than extended decrepitude.

A more realistic aim, stressed in the penultimate paragraph of the book, is to improve the *quality* of life of the elderly; their ranks are swelling in the developed world so this aim is expedient as well as humane. However, the author's views on aims are mixed with a diatribe against those concerned with age-related diseases, which results in a certain inconsistency. After provocatively stating (p. 150) that few of 'those who research age-related diseases, or those who have the responsibility for treating such diseases, are... convinced that fundamental research on ageing itself is of prime importance (untrue in my experience, at least of the researchers), he admits that one of the (worthy) aims of such research is prevention or delay of onset of the disease — and subsequently proposes exactly similar aims for ageing research.

The preface asserts that most people believe the mechanisms involved in ageing remain elusive, but later states that many existing theories have some validity. The author's own is presented on page 8: 'Ageing is due to the eventual breakdown of maintenance, and... this breakdown is the inevitable consequence of the evolved anatomical and physiological design of the organism.

Much of the book is devoted to substantiating this idea. Chapter 1 is concerned with definitions and generalities, and chapter 2 with wear and tear, and survival of individual organs. Chapter 3, which I found especially interesting, deals with topics as diverse as DNA repair, defence against oxygen free radicals, immune response, wound healing and physiological homeostasis, and chapter 4 includes somatic mutations, protein errors, oxygen free radicals and mitochondria, endocrine and programme theories, and a useful conclusion. Chapter 5 concerns life-span of cells in culture, commitment to senescence, immortalization, and apoptosis, and chapter 6 includes preservation of the germ line, the concept of programmed ageing, microbial models, and genes and ageing (another useful summary). The final three chapters discuss evolution of longevity, human diseases and ageing, and 'A better understanding of ageing'.

I enjoyed reading the book and found that the notes at the end were a non-distracting way of providing detail. My main criticism is that it is rather repetitive — perhaps inevitably when it attempts to link such diverse topics, and that occasionally, its explanations are somewhat oblique. (The cover design is probably an intelligence test). However, the book should be useful both for gerontologists and for other biomedical scientists, particularly in describing the problems of testing hypotheses, the irrelevance of many animal and especially microbial models, and the unjustifiable difficulties in publishing negative results. There is even a message for Casanovas — if they can be compared with male marsupial mice. Exhaustion after repeated sexual encounters leads to premature death!

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