of animals and plants; biotechnology is just the latest of these forces and may conversely provide a range of new techniques to deal with some of the problems. And finally, many of the pharmaceutical inventions of the past, that have so positively contributed to health-care today, would not have been possible without companies being able to protect their investment in R&D; as biotechnology becomes more complex requiring more investment the same conditions will apply.

I recommend this book to all scientists concerned about the issues of IPR; although it suffers as being a report from a conference and not a well-balanced overview, it gives valuable information in an important and fast-moving field that cannot be gained elsewhere. We can be sure that the pressures on scientists to 'transfer technology' and to demonstrate that basic research 'creates wealth' are going to increase and, whether we like it or not, patenting is here to stay and we had better understand it and control it to our advantage.

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The Encyclopedia of Molecular Biology. Editor in Chief SIR JOHN KENDREW. Blackwell Science. 1994. xxiv+1165 pages, Hardback. Price £99.50. ISBN 0 632 02182 9.

If you want to become a molecular biologist, have time to spare and live near a suitable university, you should take an advanced course in this complex and ill-defined subject which should include experimental techniques as well as theory. If you don't have these facilities, you could study a textbook of molecular biology such as *Molecular Cell Biology*, 3rd edition, by Harvey Lodish *et al.*, Scientific American Books, which will take you through the elements of biological chemistry, control of cellular activity by the nucleus, recombinant DNA technology, gene control in development, building and fuelling the cell, and integrative and specialized cellular events, helped by a wonderful array of coloured diagrams and descriptions of experiments you wish you could do.

If, however, you are a biologist with incomplete knowledge of its molecular aspects and want to find out more about topics you meet in recent literature, such as glycans, EXAFS, molecular chaperones, or bacterial chemotaxis, then you will find the encyclopedia under review particularly helpful. It contains some 5500 entries, ranging from very short definitions to substantial articles of 5000 words or more. There are 218 articles described as 'Long', which are signed and listed alphabetically and under the subject groups 'General' (one article by Sir John Kendrew), 'Structural Biology' (22 articles), 'Molecular Genetics' (49 articles), 'Bacteria and Bacteriophages' (11 articles), 'Cell Biology' (48 articles), and smaller groups under 'Evolution', 'Developmental Biology', 'Immunology', 'Neurobiology', 'Molecular Medicine' and 'Plant Molecular Biology'. The 240 contributors responsible for these articles are also listed, with names and addresses but not page numbers or titles of articles; so if you want to know what articles Z. I. Bashir, B. Blyth or A. Tramontino wrote you have to do some scanning.

All the entries are in alphabetical order, forming their own index, and there are both cross-references from one entry to another, and references to journal papers or reviews at the end of each entry. The references for some articles were not very up-to-date, which would hinder those wanting to pursue the topic further. For example, the article on molecular chaperones might just have managed to include a reference to the Cold Spring Harbor Laboratory Monograph on 'The Biology of Heat Shock Proteins and Molecular Chaperones', published in 1994; while the Cold Spring Harbor Laboratory Monograph on 'Stress Proteins in Biology and Medicine' (1990) mentioned chaperonins as a new phenomenon, the term first being used in 1988, and this book is quite relevant to the encyclopedia article on heat shock.

Sir John Kendrew's entry discusses the historical development of molecular biology since the term was first used in 1938, and offers us Erwin Chargaff's definition of molecular biology as 'the practise of biochemistry without a licence'. Two quite distinct schools developed, one primarily interested in the three-dimensional structure or conformation of biologically important macromolecules and the other in biological information and its replication. These eventually came together, and Kendrew concludes that 'today the boundaries between biochemistry, genetics, molecular biology and biophysics have become less and less well defined'. So this book has a good mixture of articles using one or more of all four disciplines. A fifth discipline which might have been included is applied mathematics; but I only found a lone short article on Fourier series, and very brief definitions of Fourier synthesis and Fourier transforms, which looked at all mathematical.

There are many fascinating cross-referenced paths one can be led into by dipping into this encyclopedia. Thus Table M2 in the article on molecular chaperones suggests that prions may be rogue molecular chaperones, but gives no reference. Prions to me spell 'scrapie', the mysterious disease of sheep that shepherds were always talking about when I first came to Edinburgh. Scrapie is actually listed in the encyclopedia and says, simply, '*See* transmissible spongiform encephalopathies', and there the whole mystery is laid out, with prions and virinos as alternative hypothetical particles, the PrPc protein with its amino acid sequence decoded, genes in mice etc. affecting the time the disease takes to manifest itself, and the infective agent purified from infected sheep passing through filters that only allow viruses to pass through.

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So it should be a virus but is extremely resistant to normal virucidal procedures. Recent approaches claim, after 40 years of struggle, to be getting near the truth, but the whole Scrapie-BSE-CJD-GSS-TME phenomenon has to me a hint of the Turin Shroud about it. I congratulate the encyclopedia team for its inclusion.

The article on bacterial chemotaxis shows the lengths to which *Escherichia coli* has gone to evolve a very sophisticated system for applying random walk theory to climbing up a liquid food gradient. Forty genes contribute to the flagellum, which can be rotated clockwise or anti-clockwise, this extraordinary engine being illustrated on page 90 by a drawing of the large working model that R. M. McNab built in his laboratory at Yale: I saw it working. A number of other genes control the switch-of-rotation mechanism and the transfer of information about any existing gradients. *Klebsiellas* are non-motile bacteria very closely related to *E. coli*, and I wish someone would make the easy checks as to which if any of the *E. coli* chemotaxis genes they possess.

As I hope I have indicated, this encyclopedia is very different from a textbook, and while it would not make a satisfactory replacement for a good textbook in class, it is far better as an easy source of information on molecular biology and covers much more ground. I think it would be of considerable value to many students and research workers – perhaps in the library rather than on the laboratory shelves because it is quite difficult to shut it after one has started browsing. Its only problem is the price.

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Epigenetic Inheritance and Evolution: The Lamarckian Dimension. By E. Jablonka and M. Lamb. Oxford University Press. 1995. x+346 pages ill., index. Hard cover, $29.50. ISBN 0 19 854062 0.

Young biologists will wonder what the sub-title is about. They may have been taught (or more likely, not) that over a century ago Weismann demolished Lamarck's theory that 'the acquisitions or losses wrought by nature on individuals ... are preserved by reproduction', and that over half-a-century ago the Modern Synthesis of natural selection and Mendelism created a coherent, testable theory of evolution, and that Lamarck was finally consigned to oblivion by the central dogma of molecular biology. In the first two chapters of this book they will find that the really ancient belief in pangenesis is not so easily shaken off, and has tempted many distinguished biologists, and some not so distinguished like Lysenko, to explore possible exceptions to the generally accepted neo-Darwinian view. There is no harm in that; but it is a side-alley particularly attractive to those who would like to improve our inheritance through environmental manipulation, which probably explains why the publisher's blurb commends this text as relevant to 'science and society' issues. Some hope!

Jablonka and Lamb are hooked on Lamarck, who is essentially an historical irrelevance: and they make their case by redefining Lamarckism as: a specific and reproducible change induced by the environment, not necessarily adaptive, involving a transmissible change in hereditary information (my words, not theirs). This is a 'soft' definition (cf. Lamarck above) which opens the door to welcoming anything which apparently contravenes the rules of DNA genetics. Not, let me emphasize, that the authors reject the Modern Synthesis: they accept it (and that relegates what they call epigenetic evolution to a side-show) but they claim it has imposed an ideological strait-jacket on evolution theory. One consequence of this stance is that there is a great deal in this book peripheral to its thesis (a gratuitous sniping at neo-Darwinism, in short). But don't let that put you off: this is otherwise a thorough, academic study of a tenable thesis (by their definition, above) which provides an entry to the relevant literature. I don't agree with the thesis but don't let that put you off, either.

The first issue examined is whether or not gene mutation is random or adaptive, for the latter would make the Lamarckian case. Since it has long been known that different loci have very different mutation rates, the data have to come from selective systems, i.e. from the last bastion of Lamarckism, namely, bacteria. The Luria and Delbrück fluctuation test which demonstrated random mutation is dismissed, and the work of Cairns and others showing that bacteria sometimes respond to selective nutritional environments by adaptive mutations is emphasized. References to papers disputing this 'directed mutation' explanation are quoted, but the arguments in them are not. This gives one the feeling of biased reporting, which tends to taint the book. But what do we mean by 'epigenetic inheritance' in bacteria? What else is there?

'An epigenetic inheritance system ... enables a particular functional state or structural element to be transmitted from one cell generation to the next, even when the stimulus which originally induced it is no longer present.' Epigenesis is an embryological concept and should apply only to processes which occur during an individual's development; but the above definition allows the concept to include generational transmission. And for that to work the authors have to invent an *epiallele*, defined as 'one of the heritable chromatin forms of a gene with an unchanged DNA sequence'. So far as I am aware, no-one has isolated such an entity. Its existence can be deduced only from inheritance patterns: single epiallele effects.

Jablonka and Lamb use the dosage compensation of eutherian mammals, i.e. X-chromosome inactivation, as their first example of epigenetic trans-