

morphogenesis and cell aggregation, perhaps because it is my field. My main objection is that it is not 'balanced'. There are many types of morphogenetic movement, yet only one class of them, long-distance cell migrations of, for example, primordial germ cells and neural crest, are considered here. Other types of morphogenetic movement — the majority in fact — such as the bending of cell sheets and the formation of tubules are not considered. The final chapter, about cell aggregation, is really little more than a review of the work of one of the authors (21 out of 28 figures in this chapter are from his own work). I would point out that cell

aggregation is not an aspect of normal development and that the significance of much of this work is questionable. Surely this is not the way to present beginners with a balanced view of developmental biology.

The figures in the book are generally of a very high standard, the bibliography is good and the index useful, though it might have been better to have separated author and subject indexes.

All in all this is a poor book, and one rather unsuitable for beginners. □

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Exciting dilution analysis

Elizabeth Simpson

Limiting Dilution Analysis of Cells in the Immune System. By I. Lefkowitz and H. Waldmann. Pp.262. (Cambridge University Press: Cambridge, UK, 1979.) £15, \$36.

LIMITING dilution analysis is a new and very powerful way of examining cell-cell interactions in the immune response. Subpopulations of lymphocytes defined with respect to different functions and by surface markers exist, and questions of interactions between them can only be partially analysed *in vivo* or *in vitro* in bulk cultures and mixing experiments. Limiting dilution analysis allows more precise and quantitative questions to be asked. This book is an extensive treatise on the rationale of this approach. It includes both a detailed mathematical analysis and methodological descriptions so that the newcomer could set up limiting dilution experiments using the book and the examples in it as a text.

The opening chapters on the immunology of a single cell (Chapter 1) and manipulation of lymphocytes (Chapter 2) describe the immunological background clearly and well. There are minor lapses such as failure to specify whether bicarbonate- or phosphate-buffered balanced salt solutions (BSS) are used in the preculture manipulations of lymphocytes (e.g. in nylon column separations of T cells) or whether 37°C incubations in BSS

are carried out in a CO₂ incubator. Also, test tubes used in some manipulations are given a 'house' name only, e.g. Wasserman tube (p.22) or rhesus tube (p.27), and further identifying specifications are not given.

Chapter 3, "Methods of Determining B Cell Responses", is detailed and gives a comprehensive description of methods that can be adapted for use on single clones including plaquing, isoelectric focussing and radioimmunoassay.

Chapter 4, on Poisson distribution, includes a discussion of single-hit, multi-hit and multi-target events, vital for any analysis of immunological responses many of which certainly involve the interaction between two or more cell types. This is illustrated by experimental examples of titration of B precursor cells and T helper cells in Chapter 5. Further experimental data are to illustrate clone size estimation (Chapter 6). Chapter 8 describes results on the analysis of B cell responses, and Chapter 9 results on the analysis of T helper cells. These two chapters contain details of experiments performed mainly by the authors during investigations of questions they have answered uniquely by using the limiting dilution analysis.

The weakest and least developed chapter is that on analysis of other T cell functions (Chapter 10) including cytotoxic T cells. Results of frequency estimations of alloreactive cytotoxic precursors are described but from the experimental details given it would not be possible to do such experiments, and this is in contrast to the sort of experimental detail used to illustrate B cell and T helper cell function. Furthermore, no consideration is given to the presence of T helper cells for cytotoxic responses and this certainly does affect the analysis.

Nevertheless this book is an excellent one: it is timely, comprehensive, well written and transmits the authors' excitement at using limiting dilution analysis to approach questions of lymphocyte function at the single-cell level. □

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Hard science in renewable energy

Chris Hope

Renewable Energy. By B. Sørensen. Pp.583. (Academic: London and New York, 1979.) £20, \$46.

I AM always wary of a book with a title so general that it implies a great breadth of coverage. All too often the reality is a book full of the cream skimmed off the surface of a subject — tasty in mouthfuls but totally unsatisfactory as a main course. When the subject is also of intense topical interest, the suspicion that the glossy covers contain nothing that will be worth recalling next year becomes almost a certainty. This book is a reminder that the improbable does happen, for it contains a deep treatment of aspects of renewable energy that I suspect will be of lasting use.

The three chapters (460 pages) concerning the origin, diverse manifestations and means of harnessing the renewable energy flows form a comprehensive treatment of the methods and principles needed to understand what it is reasonable to expect from these sources. Techniques employed include meteorology, geology and chemistry, but with a preponderance of the various branches of physics, and it is these chapters on the hard science of the 'renewables' that will make this an enduring basic text. Succeeding chapters treat energy storage and energy supply systems in a similarly technical manner.

This central scientific core is preceded by a short scene-setting chapter that comes close to sensationalism in its comparison of Man's energy usage over the last half-million years with the enormously greater amounts of energy involved in keeping our planet in its allotted place in the heavens (approximately 8×10^{33} J, if you didn't know). The book concludes with a subjective account of socio-economic assessment. This is the only chapter in which the author's strong personal views lead him in places to write as an advocate of renewable energy rather than an impartial observer.

Of course this book will not appeal to as wide an audience as a skimmed-cream book would have done. There are no descriptions of actual devices 'as constructed by the author', no colour photographs of windmills against a blue sky, just a host of line drawings, a good deal of fairly advanced mathematics and a thorough treatment of one aspect of a small but important topic typified by the inclusion of 500 references and a 1000-item index.

I recommend this book, especially to anyone running, or thinking of setting up, a course on the physics of energy. □

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In the review of *Image Analysis, Enhancement and Interpretation*, edited by D. L. Misell (*Nature* 282, 885; 1979), the prices were incorrectly quoted, thus making the final criticisms of the reviewer unfounded. The book is available in paperback, price \$31.75, Dfl. 65, or in hardback as Vol.7 of the series *Practical Methods in Electron Microscopy*, price \$66, Dfl. 135.