

organize an efficient army. They had to solicit loans from private persons who were usually domiciled outside the ruler's own jurisdiction and so were safe from confiscatory taxation. This really began the modern age — despite Professor McNeill's encouragement to us to look at the Sung dynasty in China AD 960–1279 in this light. (Incidentally, there is a certain discrepancy between Professor McNeill's comments on mediaeval China — p.48 — and his comparison with Renaissance Europe — p.62; he seems really to stand by the latter interpretation where he says that private

businessmen in China never won autonomy from their superiors nor accumulated capital on the scale that European entrepreneurs did.)

The last pages of Professor McNeill's book are provocative and interesting and end on a sensible note: "better hindsight deepens insight". Foresight also will be assisted by all sensible enough to get hold of this excellent little book.

Hugh Thomas was formerly Professor of History at the University of Reading.

importance of non-energy products in our assessments. In some cases, such as glycerol production from the alga *Dunaliella* spp., the output is predominantly of one substance, but the economics of most processes will depend upon a use for all of the fractions produced.

Other issues considered are the atmospheric consequences of various developments and the biological fixation of nitrogen. The latter is of key importance to greater and energetically more efficient production of biomass.

The book is well produced, has a useful index and comprehensive lists of references, and represents a valuable summary of the state of an important subject.

C.R.W. Spedding is Professor of Agricultural Systems and Head of the Department of Agriculture and Horticulture in the University of Reading.

Alternative energy: the biological option

C.R.W. Spedding

Biochemical and Photosynthetic Aspects of Energy Production. Edited by Anthony San Pietro. Pp.231. (Academic: 1980.) £15.80, \$28.

AS THE editor of this book points out in his preface, photosynthesis is the only method of solar energy conversion currently practised on a large scale. Increasing dependence on fossil fuels is now an extremely vulnerable condition, and this volume explores the potential of biological processes that may serve in the future to provide alternative energy resources.

Eleven contributors discuss, in considerable detail, various aspects of this enormous subject. D.O. Hall provides an introductory overview and reviews the development of photobiological conversion systems and their long-term implications from the point of view of both energy and food. He stresses the need to

consider all our energy options and not repeat the mistake of putting all our eggs in one basket.

Four chapters deal with different forms of energy from biomass production systems based on seaweed aquaculture, algal-bacterial systems, anaerobic fermentation of residues and biomass, and energy crops. All of these need further exploration; some are not yet established as technically feasible and all depend for their relevance on relative costs. This presents a major problem: how to estimate costs and prices for the future for technologies that are currently at a stage equivalent to the first motor car or aeroplane. The value and role of energy analysis is considered, but this cannot be a complete answer without regard to the fact that one joule of energy is not necessarily of the same value as another.

Several contributors emphasize the

Polyamines reviewed

Anthony E. Pegg
Hannu Pösö

Polyamines in Biomedical Research. Edited by Joseph M. Gaugas. Pp.474. (Wiley-Interscience: 1980.) £30, \$90.

KNOWLEDGE of the importance of polyamines in cellular physiology has been greatly extended in recent years by studies of the control of polyamine biosynthesis, the development of drugs interfering with polyamine accumulation and improved technology for measurement of these compounds and derivatives. Many reviews on these subjects have appeared during the past few years and this book is the latest in the series. It contains a number of outstanding chapters and, though dated, will be of considerable interest to those working in the field.

The book is a collection of 27 review chapters by different authors. About one-third of these are concerned with the control of polyamine synthesis and the role of polyamines in cell growth. There are naturally substantial overlaps in which different authors describe results from the same publications but all of these articles are by experts in the field and are of interest. Chapters by Stevens and Stevens and by Mamont, Bey and Koch-Weser give comprehensive and well-written coverage of inhibitors of decarboxylases involved in polyamine biosynthesis. This provides excellent reference material, as does the contribution on regulation of ornithine

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REASONS

Still small — photobiological conversion systems. An experimental tubular loop reactor which converts artificial solar energy into biomass.

Erratum: see *Nature* 288, 630. The title of the book written by Sandra Raphael and Wilfrid Blunt is *The Illustrated Herbal* (Frances Lincoln/Thames & Hudson, £12.50, \$25).