various models to various types of human epilepsy. However, I must concur in Jasper's own view that a detailed discussion of the technical and methodological aspects of various experimental epileptic models as applied to various problems in epilepsy is clearly beyond the scope of this chapter. It remains necessary, therefore, for the reader, who does not already possess broad knowledge in his field, to read the entire volume and fend for himself. Thus as a manual this volume will probably be difficult for the neophyte epileptologist to use. The other major defect which results in part at least from this lack of a critical overview is the limited index. For example, a unique model of epilepsy, like the "kindling effect" of Goddard, is not to be found in the index, although it is referred to in both chapter 4 and chapter 6. This limited index will make it difficult for the inexperienced investigator to readily find the wealth of material contained in this book.

These shortcomings notwithstanding, this book should be a valuable addition to the library of all who are interested in experimental epilepsy. IRA SHERWIN

Uses of Graph Theory

Graph Theory and Computing. Edited by Ronald C. Read. Pp. xiv+329. (Academic: New York and London, October 1972.) $17.50.

THIS book consists of eighteen papers presented at an International Conference held at the University of Waterloo, Canada, most of them research papers presented by expert workers in the combined fields of computing and graph theory. An excellent feature of this book is that most of the papers are self-contained. The standard is very high and there are few errors, typographical or otherwise. The papers cover a wide spectrum of areas where graph theory and computing interface. In some papers, certain topics in the theory of automata, numerical analysis and operations research are investigated from a graph theoretic point of view, whilst in others computing techniques are applied to graph-theoretic problems.

Areas not covered in the book are, among others, web grammars and their characterizations by planar graphs, analysis of loops in a program and segmentation of programs using graph-theoretic concepts and techniques, and finally graph theory applied to the analysis of complex information structures. This is to be expected, however, for graph theory and its application in computing is a rapidly expanding field.

The book will appeal to pure graph theorists, computer scientists, modern applied mathematicians and possibly electrical engineers. Any research worker in these fields is well advised to keep a copy of this book. Additionally, listed in the book are various unsolved problems, which can easily form the core of further research. All in all, the book is an admirable endeavour in bringing together the various disparate fields where graph theory, matrix theory and computing are interwoven.

G. LOIZOU

Equilibrium Analysis

Mathematical Methods in Theoretical Economics. By Erwin Klein. Pp. xix+388. (Academic: London and New York, February 1973.) $16.50.

THIS is an early volume in a new series on mathematical economics, one of several very welcome series now running. The title over-sells the contents and a better description is provided by the subtitle: "Topological and Vector Space Foundations of Equilibrium Analysis".

There are three broad and somewhat overlapping areas of mathematical methodology currently cultivated by economists: analysis including real and complex variable, difference, differential and mixed equations; linear algebra and theory of linear models; game theory, programming and control theory. Economic theorists take fairly naturally to the set-theoretic and mathematico-logical underpinning of mathematical methods and, indeed, they have developed some direct applications to economic models. Erwin Klein has here confined himself to this last topic and in so doing he has produced a clear and useful text for an advanced course in mathematics for economic theorists.

This said, it needs to be added, as the author himself notes in his preface, that the book comprises two short and separate texts on only distantly related subjects. In each case, a sequence of purely mathematical chapters is supplemented by a few economic examples and followed by a short but direct and systematic application to a basic economic problem.

The first of the two almost self-contained texts is on point-set topology as a basis of function theory (analysis). The topics discussed are wider in scope than this might suggest and include point-to-set as well as point-to-point mappings and fixed-point theory. The concluding application is a simplified version of Debreu's axiomatic approach to the problem of general economic equilibrium. The second text is a development of modern linear algebra on the basis of vector spaces and, of the many uses in economics, the one selected for brief exposition is Gale's version of the classic model of growth first constructed by von Neumann.

The first of these texts may be without a serious competitor as a course for economists but the second faces quite stiff competition, for example, from Yaari's recent *Linear Algebra for Social Sciences*, a good deal simpler than Klein though less wide in scope. Klein's writing is clear and precise; a list of terms and notations would, however, make for even easier reading. Of the few detected slips the most serious is at the top of page 309 where the conditions for maxima and minima are in fact sufficient only. Necessary conditions are easily written by substituting $\leq$ for $<$ (and $\geq$ for $>$); necessary and sufficient conditions involve more than second-order terms.

R. G. D. ALLEN

Rate Processes

Advances in Linear Free Energy Relationships. Edited by N. B. Chapman and J. Shoeter. Pp. xiv+486. (Plenum: London and New York, September 1972.) $28.

"To my mind a particularly happy aspect of the existence of linear free energy relationships has been the proof it supplies that one need not suppose that the behaviour of nature is hopelessly complicated merely because one cannot find a theoretical reason for believing it to be otherwise". Thus Louis P. Hammett in a foreword to the present volume indicates the frame of mind in which he proposed the famous equation which bears his name. The value of linear free energy relationships ". . . should not be obscured either by the fact that there are always small seeming deviations from the relationships . . . or by the over-optimism with which relationships have sometimes been reported or interpreted".

The late Sir Christopher Ingold said that a theory could be simple and inaccurate, or complex and accurate, but should never be complex and inaccurate. The strength of the original Hammett equation (1) lay in the fact of its simplicity. For a reaction

$$\log k/k_0 = \rho\sigma \qquad (1)$$

(characterized by ρ), the relative rate of a substituted compound, as compared with the unsubstituted species, depended only upon σ, a property of the substituent. The present volume examines the subsequent developments of equation (1) in many diverse fields ranging from drug action to mass spectrometry. As is not uncommon these days, the volume is composed of chapters written by experts in the various fields, reviewing their particular areas. The extent to which this has been successful is to some degree evidenced by the 2,500-odd references to be found in the volume.

This book will be of interest to all concerned with the physical-organic approach to rate processes.

ALLAN MACCOLL