

giving data on the behaviour of background electrolytes and reference electrodes in a number of solvent systems.

The authors state that the book is based on a literature search covering the period to the end of 1968. The result is a systematic but rather uncritical review of this literature together with a large and useful compilation of the electrochemical reaction potentials of many compounds. There are chapters dealing separately with particular classes of compounds and no further attempt is made to show the underlying unity of the subject nor to discuss the many urgent and unanswered questions in the field. One looks in vain for the authoritative touch, the panoramic view that might delineate the skeletal structure on which the great mass of data can be hung, so that the basic chemistry is emphasized. Thus the reader is neither stimulated nor guided but merely informed. It must be conceded that the information provided will be of great use to research workers in the field, and the publishers' claim that the book serves as a reference and guide to the literature is well justified. This function is, however, vulnerable in view of the rapid development of the subject since 1968 and in many respects the book is already outdated. Thus one questions the whole concept of producing a review of this type in book form rather than as a regularly updated series in the review literature. A glance at the price strongly reinforces this view.

A. BEWICK

Useful Mathematics

Low Energy Hadron Interactions: Invited Papers Presented at the Ruhestein Meeting, May 1970. (Springer Tracts in Modern Physics: Ergebnisse der Exakten Naturwissenschaften, Volume 55.) Pp. v+290. (Springer-Verlag: Berlin and New York, 1970.) 78 DM; \$21.50.

THIS volume consists of papers, chiefly of a review nature, given last year at a specialized meeting on low energy interactions of strongly interacting particles. They describe investigations in elementary particle physics which are more humdrum—and more typical—than the occasional sensations which reach the popular press.

During the past twenty years countless experiments at all the large accelerators have measured the cross sections for pions, nucleons, kaons, and photons scattering off nucleon targets. Dynamical attempts to calculate these cross sections have had very limited success, with the result that many theorists have become more modest in their ambition, and content themselves with fitting experiment by parametrizations incorporating the best founded theoretical constraints, but with little predictive

power. The aim is to determine masses, coupling constants, and scattering lengths, which are then treated as data to guide the construction of a proper theory.

Many such analyses have been performed, with continually changing assumptions and a steady improvement in the experiments. Not surprisingly, conflicting values for the parameters have often been obtained, so that there is a need for a book such as this to assess the present position.

The chapter by Pisut on analytic extrapolation is of the most general implication for this type of work. Most analyses involve extrapolating a scattering amplitude, considered as a function of energy or some other complex variable, from a region where it is approximately known by experiment to some other point or arc, where it gives the value of a coupling constant, or the amplitude for another reaction. The stability of such extrapolations under small changes of experimental data has recently been considered in some intimidatingly mathematical papers. Pisut lucidly conveys the ideas behind these, and their conclusion that in certain cases only the average over an arc, not the value at a point, can be determined reliably. This chapter is closely tied in with one by Morgan and Pisut, which gives a clear and critical guide to the welter of analyses of pion-pion scattering.

The other major chapter is B. R. Martin's comprehensive review of kaon-nucleon interactions below the resonance region. This authoritatively covers the many phase-shift and K-matrix fits, and is particularly strong on the use of dispersion relations and sum rules. In related shorter articles A. D. Martin deals with determinations of the KN coupling, and Pilkhun with SU(3) and PCAC predictions for baryon-meson couplings.

Pion-nucleon scattering is not covered, except for a discussion by Oades of Coulomb corrections. In nucleon-nucleon scattering, which has not changed much recently, analyses to find the couplings of exchanged mesons are reviewed by Kramer.

Photon-hadron interactions are represented by Gourdin, dealing with vector meson dominance, and Pfeil and Schwela on photoproduction of pions, etas and kaons.

Michael gives a good review of couplings from the viewpoint of Regge theory, vector dominance and SU(3). This chapter goes some way to remedy the chief weakness of the book, which is the lack of general discussion of the implications for currently fashionable ideas of all the constants so laboriously evaluated.

Appropriately, the book concludes with the useful, and steadily growing,

compilation of coupling constants and low energy parameters by Ebel and his colleagues.

The general layout is attractive, except for the typescript format of the final compilation. An index would have been a help, as the book will be used mostly for reference. But these are minor criticisms of a volume which many experimental and theoretical particle physicists will find of considerable value.

A. T. DAVIES

Ancient and Modern

Modern Methods in the History of Medicine. Edited by Edwin Clarke. Pp. xiv+389. (Athlone: London, April 1971. Distributed by Tiptree: Essex.) £5.50.

THIS is a salutary book, at a time when so many people are preaching how interesting and important medical history is, without, perhaps, sufficient attention to its academic quality. Dr Clarke has, naturally, had rather more than difficulty in keeping his collaborators to the matter in hand, but even when they pursue side issues they are well worth reading. The book makes rather a heavy start with two papers from America, where an academic style all too reminiscent of the turgidity of nineteenth century Germany is not unknown (how do you "create paradigmatic models which shape ideas of disease and disease causation"?). But later chapters from the United States restore the balance, and the reader is immediately refreshed by a splendid paper in English from Rhodesia. Professor McKeown gives an illuminating example both of strict thinking and of the demographic method of attacking the well known problem of the increase of population in the eighteenth century, and Professor Holmes of Yale provides a fascinating chapter on the use of "case histories" (stories of how single great discoveries were made) as examples of scientific method, and on the suggestion that the intellectual processes of advanced research differ from those required for making simple discoveries. Professor Fullmer's chapter on the history of biography as an art, and its different attitudes, objectives and interests at different times, is most illuminating.

The range of the book is one of its attractions. It covers much more than recent methods: it deals largely with new attitudes to the whole subject, away from the old fashioned seeking for "first descriptions" and priorities of discovery, through current interest in the history of ideas and of medical technologies, into new aspects of social medicine and such notions as the use of the study of what is happening in developing countries now, and throw-