working in quantum theory, and plausible but non-rigorous treatments are well known. Titchmarsh has succeeded in giving rigorous proofs and has put all quantum theorists heavily in his debt by his careful analysis of the complex and difficult questions of eigenfunction theory. His investigations of the expansion theory, the perturbation theory and the spectral theory are each of significance for the applied mathematician and, if not every proof can be described as short and simple, they are all admirably lucid and cogent.

G. TEMPLE

ELECTROCHEMISTRY

Electrochemistry

Principles and Applications. By Dr. Edmund C. Potter. Pp. xii+418. (London: Cleaver-Hume Press, Ltd., 1956.) 50*s*.

THE author states that his aim was to produce a concise introductory text for the technological student and the specialist electrochemist in which he would endeavour to reflect the modern emphasis on a more dynamic and mechanistic interpretation of electrolytic processes than, presumably, has hitherto been the case.

To write a book which would be of service to the beginner and the specialist alike would, indeed, be an accomplishment, and this the author has certainly not achieved. This book is more likely to be of use to the student who has already gained a grasp of the fundamentals of electrochemistry from the standard works on physical chemistry, and who wishes to acquaint himself with the industrial applications of the subject.

The mechanistic interpretation of electrolytic processes refers essentially to the interpretation of the dependence of hydrogen overpotential on current density. This has been included in text-books which have been published within the past twenty years.

Regarding the chapters dealing with fundamentals, the logical development and presentation often leave much to be desired: the English is not always good and the sentences are often involved and obscure. It is likely that the text was based on rather sketchy lecture notes, for it lacks much of that explanatory matter which a lecturer must expound but which the student may not then think it worth while to record.

The treatment of the Arrhenius, activity and Debye and Hückel theories is so cursory that a student would not be able to glean anything very substantial from it. Throughout, the term 'activity' is applied to ions, but the author does not indicate that the activity theory has only been satisfactorily applied to the electrolytes contained in 'cells without transport'. One such cell is described, but advantage was not taken to show how it might be used to determine experimentally the mean ionic activity of an electrolyte, for example, $a_{\pm HCl}$.

It is somewhat disturbing to read on p. 83 that "Nernst's original arbitrary zero of potential is that potential corresponding to the reversible equilibrium between hydrogen gas at one standard atmosphere pressure and hydrogen ions at unit activity". In 1900 Nernst stipulated that the electrode solution should contain hydrogen ions at unit concentration, and it was not until 1913 that G. N. Lewis advocated the substitution of activity for concentration. Dr. Potter does not explain that the activity of a single ion cannot be determined experimentally and that it is necessary to assume that, for example, for hydrochloric acid, $a_{\pm HCl}$, is equal to a_H. Instead, he merely states that "If the electrolyte used is hydrochloric acid a strength of approximately 1·2 *N* at 25° C. corresponds to unit activity of hydrogen ions", and he gives no clue how such a concentration has been experimentally ascertained.

The misuse of the terms 'strength', 'strong' and 'weak' in referring to solutions and current is to be deplored, for chemistry teachers have, for many years past, been deprecating the use of 'strength' as being synonymous with 'concentration', and 'current' (a rate) as being synonymous with 'electricity' (a quantity). Such phrases as "electric current flows" (p. 1) and "passage of current for 1 second" are particularly objectionable. Many of the conductometric titration curves depicted are defective, and especially that for phosphoric acid. In defining 'acids' and 'bases' in terms of the Lowry–Brønsted theory, 'hydrogen ions' should read 'protons'. The method of deriving expressions for electrode potentials can scarcely be adapted to the electrodes in a cell with transport.

Though by no means a complete survey of electrochemistry, the last half of the book is obviously that part of the subject with which the author is more intimately conversant and it brings together a good deal of useful material.

H. T. S. BRITTON

NEOMYCIN

Neomycin

Its Nature and Practical Application. Edited by Selman A. Waksman. Pp. x+412. (London: Baillière, Tindall and Cox, Ltd., 1958. Published for the Institute of Microbiology, Rutgers University.) 40*s*.

THE comprehensive screening programme to which the Actinomycetes, and in particular the members of the genus *Streptomyces*, have been subjected in various laboratories has provided many new antibiotics, a number of which are of value in chemotherapy. As a result of such a programme, Waksman and Lechevalier in 1949 announced the discovery of a new basic antibiotic which was named 'neomycin'. It was active against bacteria resistant to streptomycin, including tuberculosis organisms. It was thought that the new antibiotic might have all the desirable properties of streptomycin without its disadvantages, and that it could find an important place in tuberculosis therapy. Unfortunately, the high hopes at first entertained of neomycin were not fulfilled in practice, since clinical trials showed that when administered parenterally it had an irreversible injurious effect on the auditory system. Neomycin has, however, gradually established itself, in spite of its limitations, as a useful antibiotic and indeed the drug of choice in certain infections.

As commercially prepared, neomycin is a mixture of two isomeric compounds, neomycin *B* and neomycin *C*, in which the former predominates. Although the molecular structure of neomycin is not yet completely established, sufficient is known to place it as closely related to streptomycin, from which, however, it differs considerably in biological properties. It has a wider antibacterial spectrum than any other antibiotic, is rapid in action, shows little tendency to produce resistant organisms and rarely produces