the specialist the details of evidence and argument are available, in addition, on the library shelves.

For each species and recognized geographical race found or occurring in the area, the essential facts are given under the heads of distinguishing characters, general distribution, range in eastern Africa, habits, nest and eggs, food, call and (where applicable) distribution of other races of the species ; the particulars relating to reproduction are omitted where the species or race is not known to breed in the area. English and scientific names, with full references for the latter, are of course also given ; and the species are consecutively numbered. In addition, there is a brief general note on each family and a key for the identification of the included species.

There are little marginal maps showing the distribution of each species or race. This is an attractive feature, which one hopes to see followed in other works : another book which is in course of preparation has indeed independently adopted the plan. The illustrations of birds include marginal drawings in black-and-white and numerous figures in coloured plates : although the colour reproduction does not seem to be of the highest standard, both are well suited to their purpose. There are also some plates of photographs from life.

The book is very well printed by lithography, and attractively produced. In every way it should be a pleasure to use, and its availability should be a great stimulus as well as help to the further study for which abundant scope remains. An index of English names is lacking, but it may be intended to provide this for the work as a whole at the end of the second volume.

This first volume deals with the non-passerine birds, from ostriches to pittas. The groups that bulk most largely are the herons and storks, ducks and geese, birds of prey (no less than eighty-three species), game-birds, plovers and their allies, pigeons and barbets. Of the last, there are thirty-three species in eastern Africa, including "the Tinker Birds, Brain-fever Birds and others whose monotonous notes have been commented on with varying virulence". The richness of the avifauna reflects not only the extent of the area but also the variety of its country, from desert to primeval forests, from coast to great lakes, and from swamps to highlands, the last culminating in places with the zone of giant heather and lobelias, leading up to snow-clad peaks.

LANDSBOROUGH THOMSON

CHEMICAL CALCULATIONS

Problems in Physical Chemistry

By Prof. Lars Gunnar Sillén, Paul W. Lange and Carl O. Gabrielson. (Prentice-Hall Chemistry Series.) Pp. xiii+370. (New York : Prentice-Hall, Inc., 1952.) 6.65 dollars.

Chemical Calculations

An Introduction to the Use of Mathematics in Chemistry. By Prof. Sidney W. Benson. Pp. xi+217. (New York : John Wiley and Sons, Inc. ; London : Chapman and Hall, Ltd., 1952.) 24*s*. net.

A TRAINING in calculations is an essential part of the education of a chemist. The student (or the teacher) cannot really understand a quantitative physical law until he has applied it in numerical problems. Books of more-or-less elementary chemical calculations are fairly plentiful ; but—apart from Wolfenden's "Numerical Problems in Advanced Physical Chemistry" (1938)—none had been published during the past quarter of a century that was reasonably modern in outlook and sufficiently advanced for an honours class in physical chemistry. This need is now met by the first of the two books under review.

"Problems in Physical Chemistry", by L. G. Sillén, P. W. Lange and C. O. Gabrielson, is an American version, prepared by the original authors from the second Swedish edition, of a book which appears to have been very successful in Scandinavia. It comprises eleven chapters with the following titles : first law of thermodynamics ; second and third laws of thermodynamics ; partial quantities, activities ; law of mass action, gas equilibria ; solution equilibria ; chemical electromotive forces ; solubility, complex and redox equilibria ; acid-base equilibria ; transport of electricity by electrolytes ; rate of reaction ; phase boundaries, atoms and molecules. (The ground covered is therefore correctly described in the title as physical chemistry rather than chemical physics.) Appendixes deal with methods of numerical calculation, and give lists of symbols used and of journals quoted and the answers to the problems. There are adequate author and subject indexes.

Each chapter begins with a section (10–20 pp.) summarizing the principles to be used and illustrating them by worked examples, and then sets out a large number of problems for solution. Altogether there are about 750 of these, nearly all of them taken from original papers to which references are given. They are thus real-life problems rather than arbitrary academic exercises, and anyone (graduate or undergraduate) who works through a selection of them will acquire a good knowledge of physical chemistry and its literature. Though the authors explicitly disclaim them as substitutes for a text-book, the introductory sections are excellent ; they contain a large amount of useful information in a very concise form and are up to date. Wise guidance is given as to the accuracy of experimental data and to the various levels of approximation needed in calculations based on them. Occasionally the authors comment on the original work used in the problems, and their comments are always most illuminating.

This is certainly one of the best books of advanced chemical calculations at present available. It would be a pity were the rather high price to restrict its general adoption as a standard text for all honours courses.

The other book, "Chemical Calculations", by S. W. Benson, is much more elementary, despite the solemnity of its sub-title. It is intended to coax a first-year (intermediate) student, who has no mathematics, into some understanding of the numerical way of dealing with chemistry. It has seventeen chapters covering the usual range of topics in elementary general and physical chemistry, each chapter ending with a group of ten or twenty simple exercises. The book starts with such matters as converting x grams to pounds or the use of logarithms, and reaches as far as simple ionic and redox equilibria. No calculus is introduced. What it sets out to do, the book does well enough ; it is clearly and interestingly written, and—at its level—sound and up to date. (But it surely sets the cart before the horse in calling the van t'Hoff isochore the "Arrhenius equation for equilibrium constants".) To those students who can afford to pay a relatively high price for an elementary book, it may well prove very useful.

J. C. SPEAKMAN