dealt with by reference. Very little previous knowledge, but a reasonable degree of sophistication, is assumed, so that a first course in elementary methods of numerical analysis involving some direct acquaintance with desk computation is a desirable prolegomenon.

The first three sections deal with ordinary differential equations, integral equations, and the simpler partial differential equations. This is the text-book part of the volume, and is largely the work of Dr. Fox himself and Dr. D. F. Mayers. For ordinary equations, the methods of dealing with initial-value and boundary-value problems are crisply described, and particular attention is directed to the study of stability of processes, and to the care needed to avoid the introduction of spurious solutions which may submerge the true solution beyond trace. Two valuable chapters describe recent work by Lanczos, Clenshaw and Fox on the application of Chebyshev polynomials. In an integral equation, the replacement of an integral by an approximative sum is an obvious line of attack, but this barely scratches the problem; the treatment here is up to date but should suggest many lines of inquiry to the research worker. The vast field of partial differential equations can scarcely be fully explored in 100 pages, but once more the main approaches are depicted concisely, while the reader is left with the impression that much deeper questions remain to be tackled.

In the fourth section, the tone changes. Here experts from research centres are dealing with the actual problems, chiefly of partial differential equations, now being investigated, over a wide range of topics: nuclear reactors, unsteady fluid-flow, transport equations, Monte Carlo methods, plasma physics, weather prediction, etc. All this is recent work, with sometimes the rough edges and unfinished air of growth which should stimulate the young research worker.

Throughout the book, the use and power of electronic computation is stressed, and the tone of modernity is maintained in the bibliography, where most of the references are to publications of the past decade. For the worker beginning research in numerical analysis as a study in its own right or in its applications to present-day physics and engineering, this book is invaluable. It must also be available for reference in any scientific library.

T. A. A. Broadbent

SEPARATION OF METALS BY MEANS OF ORGANIC BASES

The Application of Organic Bases in Analytical Chemistry

By E. O. Ostroumov. Translated from the Russian by D. A. Paterson. Pp. xxv+159. (Oxford, London, New York and Paris: Pergamon Press, 1962.) 50*s*. 8.50 dollars.

THE separation of complex mixtures of metals has always been one of the most troublesome problems of analytical chemistry. Although efficient methods have been developed they are usually time-consuming and demand great skill on the part of the operator; reprecipitation is often necessary and the precipitates obtained (hydroxides, hydrated oxides or sulphides) are generally in an undesirable physical condition. It is necessary to apply separation methods to mixtures of metals from the second, third and fourth conventional analytical groups, particularly when the final determination is based on classical gravimetric or titrimetric procedures.

Ostroumov describes new separation methods applied to the analysis of rocks, ores and minerals. Precipitation is effected by the organic bases, pyridine, α-picoline and hexamethylenetetramine. These bases enable the *p*H to be controlled within very narrow limits, and by forming stable complexes with many of the divalent metals, reduce co-precipitation to negligible proportions. Moreover, the precipitates obtained are in a compact form and can be filtered readily.

Particularly interesting is the method used for precipitating sulphides. It is well known that for each metal there is a definite *p*H value at which its sulphide precipitates in the most compact form. When this precipitation is done in a solution containing hexamethylenetetramine, the latter slowly decomposes and there is a gradual rise in *p*H. The first sulphides to precipitate are those formed at low *p*H values, and this stepwise precipitation continues until, at the highest *p*H, manganese sulphide is produced in a red crystalline form. Sulphides precipitated in this way are not readily oxidized by air.

Two major criticisms can be raised against this monograph, neither of which concerns the scientific content. First, the title is misleading, for there are many applications of organic bases in analytical chemistry other than in controlling *p*H, and the title implies that the monograph gives a comprehensive account of the application of all such reagents ; secondly, this monograph appears to be a collection of published papers, and so contains material which is not customarily retained in a monograph, for it is of little interest to the general reader. This material could have been omitted. This is, of course, one of the difficulties of translation from the Russian; the translator is not usually an expert on the subject, and the expert knows no Russian and so cannot judge the contents until the translation is complete. Nevertheless, the eighty tables which consume so much space could have been eliminated without loss.

These remarks do not lessen the value of the work described; it would seem that some very ancient problems have been solved, and the monograph should be studied by all concerned with this type of analysis.

R. Belcher

A NEW APPROACH TO PLEOSPORACEAE

A World Monograph of the Genus *Pleospora* and Its Segregates

By Prof. Lewis E. Wehmeyer. Pp. ix+451 (25 plates). (Ann Arbor: University of Michigan Press; London: The Cresset Press, Ltd., 1961.) 15 dollars; 105*s*. net.

PROF. WEHMEYER has played a prominent part in the revival of interest in the taxonomy of the Pyrenomycetes. The present volume is based on the work of twenty years of collecting and investigation and deals with four muriform-spored genera of the Pleosporaceae. *Pleospora* is the central and largest member with a hundred species and forty varieties; *Pyrenophora* has seven species; *Platyspora*, a new genus, has three species; and *Clathrospora* has eight species and four varieties. Ascospore morphology is used as the basis of separation throughout, and Wehmeyer considers "the developmental sequence and morphology of the spore is of prime importance in recognition of the species".

The large number of species in the genus *Pleospora* are divided into five sub-genera and the largest of these, *Pleospora*, is again divided into two sections and two sub-sections (*Pleospora* is used as a generic, sub-generic, section and sub-section name). Excluding the sub-genus Cylindrosporae the primitive members of each series have three transverse septa and the phylogenetic relationship of these with the more advanced members is shown by a chart. Although spore morphology is the primary basis for determining relationships, some correlation is demonstrated between related species and their host and geographical distribution.

The eleven-page key to genera and species works reasonably well, although var. *alpina* (p. 35) does not appear to be mentioned again, and it leads to some irritation when the pagination of the species listed in the key