but, like the hero in Samuel Beckett's *Waiting for Godot*, Friedmann remains offstage, and the reader is left wondering what he has to say and what makes him so important.

Walker himself, unfortunately, falls victim of his own method, to the extent that his essential contribution to the field is misrepresented by this book. Walker is important above all because he is neither technocrat nor human relations faddist. He has emphasized from the first that human relations are not enough and that the job, the work, the tool, the economic performance, are as important as psychological or sociocultural satisfactions and values. He never forgets that a shoe factory employs people to turn out decent shoes at low cost rather than to make the employees happy. He knows—in sharp contrast to a great many behavioral scientists—that technology is also a creation of man, which represents human values, human achievements, human aspirations—and that economic satisfactions are also human satisfactions. Few readers, unacquainted with Walker's writings, would guess this from the present book, which is heavily biased toward the kind of human relations writing that treats the work itself and the tools, technology, and economic performance as irrelevant to the interpersonal relations, cultural values, and human experiences of the worker. Walker lets a group of English scholars say in one of the excerpts: "So close is the relationship between the various aspects (of production) that the social and the psychological can be understood only in terms of the detailed engineering facts and of the way the technological system as a whole behaves in the environment . . ." [E. L. Trist and K. W. Banforth, *Human Relations* **4**, 3 (1951)]. But this quotation, which should have been the key to Walker's book, does not occur until page 424; and even then there is nothing to tell the reader that it derives from Walker and sums up Walker's own basic position and contribution.

Still, this is a fascinating book, in the way a kaleidoscope fascinates. And it does succeed in conveying the importance of the subject as well as the amazing fact that work, that most familiar and most general activity of man, is also the least known, the least understood, and still the least studied area of life and society.

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Deutsche Ausführlichkeit

Ion Exchange. F. G. Helfferich. McGraw-Hill, New York, 1962. ix + 624 pp. Illus. $16.

It is remarkable that the field of ion exchange is still so much alive. The phenomenon has been known for more than a century, its applications have been exploited for nearly as long, and the last 20 years have seen intensive and continued research into what seems to be at first sight so simple, the ion exchange process itself.

Ion Exchange is a book about fundamentals. It first appeared in the German language as *Ionenaustauscher*. vol. 1. *Grundlagen* (Verlag Chemie, 1959). This was the bible of ion exchange, a model of "deutsche Ausführlichkeit" at its inspired best. And *Ion Exchange* is not just a translation; it is a new edition, rewritten by the author himself, in lucid and flawless English, and brought completely up-to-date. The publishers, to their great credit, wasted no time in getting the manuscript into print.

The first chapters are relatively brief and describe the structure of natural and synthetic ion-exchanging materials, including membranes. Then follows a long chapter on ion-exchange equilibrium, which takes up one-fourth of the book and which includes a list of 306 references. Chapters on kinetics, membranes, and ion-exchange columns follow, and then chapters on electrochemical properties, nonaqueous solvents, catalysis, and electron-exchange polymers. Detailed mathematical treatments are given, but the nonspecialist reader may skip these if he wishes; they are accompanied by well-written qualitative explanations and helpful comments on experimental techniques. There are many graphs and diagrams; these are not merely copied from the original papers but have been redrawn and are often much more lucid than the originals. Each chapter closes with a two- or three-page summary.

The book is authoritative, as it should be, for Helfferich has contributed to the field in several ways, including his work on kinetics, membrane theory, catalysis, and the new technique of "ligand exchange." Yet he does not overemphasize his own contributions; the presentation is well-balanced and even, and in many sections, such as that on the Nernst-Planck treatment of membranes, it is nothing short of masterly.

Specialists in ion exchange seeking background information for their research will find it quickly in this book. Workers in other fields who wish to use ion exchange as a tool will not find detailed prescriptions or procedures, but they will gain an unusually clear insight into the nature of the effects they plan to use, together with a wealth of practical information and leading references to speed them on their way.

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Encyclopedic Summary

Atoll Environment and Ecology. Herold J. Wiens. Yale University Press, New Haven, Conn., 1962. xxii + 532 pp. Illus. Plates. $15.

As the author, Herold Wiens, states, his book is essentially a reference book or encyclopedia of atolls, an attempt to bring together between two covers information on all facets of atoll ecology. It is not particularly concerned with the history of exploration and of scientific study but mainly summarizes the results of recent studies made in the Central Pacific Ocean. A very large source of information is that provided by field studies made since 1950 under the auspices of the Pacific Science Board and the Office of Naval Research, the results of which have been distributed in the mimeographed *Atoll Research Bulletin*. Much other work has been done by the U.S. Geological Survey's Military Geology Branch, beginning during World War II and continuing afterward, in the Marshall Islands, the Marianas, and other areas of military interest. Results of these two decades of field work had not been assembled and compared prior to Wiens' book.

The scope is indicated by listing the number of pages devoted to each topic: geology, 135; weather and climate, 51; physical oceanography, 42; marine fauna, 67; birds, 21; ground water and soils, 35; land plants, 52; land animals, 52; and man, 13. When I noted this wide range of subject matter in the table of contents, I thought the treatment would have to be sketchy. However, the text itself proved to be a thorough and well-written treatment. In fact, my interest was such that, at times, it was hard to lay the book down. Di-

rect quotations from original sources are used liberally. This technique is in line with the stated objective of describing atolls, an objective that is admirably attained. Although future studies will add major and minor details of ecology, the book serves a timely need.

Unfortunately, but doubtless because of his objective, Wiens made less use of cross-references between different fields of study than might be desirable; he preferred to treat each as a separate entity. Perhaps for the same reason, there are few new deductions or discoveries resulting from the compilation. The book is essential reading for future workers on atolls, regardless of their fields of inquiry.

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Infeld Festschrift

Recent Developments in General Relativity. A collection of papers dedicated to Leopold Infeld. Państwowe Wydawnictwo Naukowe, Warsaw, Poland; Pergamon, New York, 1962 (order from Macmillan, New York). 472 pp. $8.

This book, a collection of 45 individual contributions, was, during its period of gestation, known as the "Infeld Festschrift," and it is dedicated to Professor Leopold Infeld, former collaborator of Albert Einstein and now professor at the University of Warsaw, on the occasion of his 60th birthday. It consists of seven review articles (part 1) and 38 contributions that represent original research papers (part 2). The list of contributors represents at least half a dozen countries, but only two languages—English and French—are used in the volume (the latter being used for only three papers).

The importance of this otherwise representative collection is marred by the inordinate delay between the solicitation of contributions (as far as I am aware, the announced, and enforced, deadline was December 1959) and the date of publication (1 August 1962, in the United States). Perhaps such delays are to be expected when publishers in different countries collaborate without much previous experience. At any rate, the typography and press work are all that could be desired.

The review articles are concerned with the theory of motion (Bażański), the program of quantization of the gravitational field (Bergmann and Komar), cosmology (Bondi), experimental verification (Ginzburg), various mathematical problems, both local and global (Lichnerowicz and Fourès-Bruhat), theory of gravitational radiation (Pirani), and unified field theory (Tonnelat). The remaining articles may be considered to fall into one, or several, of the categories indicated by the review articles, which indeed represent the major areas of research activity in general relativity during recent years. The average length of the so-called review articles exceeds that of the other articles by only about 50 percent. The editorial committee thus succeeded in presenting several approaches in those areas in which opinions widely differ, rather than selecting "orthodox" views.

The nonspecialist theoretical physicist should be able to derive significant information from this volume, but all contributions are technical and were written with fellow experts in mind. The book will undoubtedly grace the reference shelves of all active relativists.

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Useful Alternate Procedures

The Analysis of Titanium, Zirconium, and Their Alloys. W. T. Elwell and D. F. Wood. Wiley, New York, 1962. xi + 198 pp. Illus. $7.75.

This valuable compendium of practical and generally reliable methods should be helpful to chemists who have a practical interest in analyses of titanium or zirconium, but there are deficiencies in the sections dealing with the analyses for hydrogen and oxygen. The authors do not mention the commercial availability in the United States of superior apparatus for vacuum fusion and hot extraction. At least three competitive manufacturers provide units which are comparable in accuracy but which are also much less complicated and many times faster than the apparatus described in this book. Chemical methods for oxygen, such as the chlorination procedure described by the authors, have been tested and abandoned by many competent laboratories. The apparatus described for determining nitrogen and carbon are also cumbersome and slow, and they offer no advantage in precision or accuracy.

The stated *Reproducibility* (defined as the standard deviation) constitutes an interesting figure of merit for each procedure, as it did in the previous titanium edition. But it is discouraging to note that these values and the methods have not changed significantly since 1959.

The bibliography cites some materials that are either out-of-print or have been replaced by more recent publications. Fourteen of the 58 references involve work by the authors, and more vital publications are not mentioned: for example, recent papers in *Analytical Chemistry* on improvements in the determination of oxygen.

These criticisms, which are mostly concerned with things *not* included in the text, suggest that Elwell and Wood have underestimated the importance of the book to persons outside their own laboratories. In the United States the book will be a useful source of many good alternate procedures, for most of the methods are quite different from those published by the American Society for Testing and Materials. Many methods are presented for determinations that have not been tested by ASTM or other recognized authorities. These will be of particular interest in many laboratories, and they could result in improved performances.

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Applied Mathematics

Fourier Series. Georgi P. Tolstov. Translated from the Russian and edited by Richard A. Silverman. Prentice Hall, Englewood Cliffs, N.J., 1962. x + 336 pp. Illus. Trade ed., $13; text ed., $9.75.

An Introduction to Fourier Analysis. R. D. Stuart. Wiley, New York, 1961. 126 pp. Illus. $3.

The first of these books is, according to the publisher, a translation of the standard introductory work on Fourier series and boundary value problems used in the Soviet Union. Tolstov deals with the subject matter in an up-to-date