The few errors in the book are serious—for example, the statement that "energy is given off when elements of high atomic number are broken down into their nucleons." In the example of a two-component decay curve, the short-lived species is incorrectly resolved. The discovery of element 102 is confused with that of mendelevium, and the diagrams of energy level in which positron emission goes "uphill" are annoying.

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Metallurgy

Electronic Structure and Alloy Chemistry of the Transition Elements. Paul A. Beck, Ed. Interscience (Wiley), New York, 1963, 261 pp. Illus. $12.

This book, which is based on papers presented at a symposium sponsored by the Metallurgical Society and the American Institute of Mining, Metallurgical, and Petroleum Engineers, contains eight chapters, each written by a specialist in the field.

Harvey Brooks discusses theoretical models for transition metals and their alloys and gives a very complete summary, from the theoretical viewpoint, of our present knowledge of bonding in transition metals. He provides an extensive list of references. The most important developments leading to future progress in the field are, according to Brooks, the study of localized magnetic states in dilute alloys, studies of the hyperfine field at the nucleus in ferromagnetic materials, and the influences of many-body effects on properties of, and at, the Fermi surface. F. E. Hoare reviews what specific heat measurements can contribute to the study of the electronic band structure of transition elements and their alloys. For the second and third transition series, the results can be reasonably well explained on a simple rigid-band model. For elements of the first transition series, additional knowledge is needed of the magnetic behavior of some of these alloys, particularly at low temperature. J. Crangle discusses the ferromagnetic properties of alloys of the first transition series as well as those of dilute solutions of ferromagnetic elements in palladium and platinum.

C. G. Shull presents a short but complete summary of the magnetic electron configuration in iron, which can be deduced from magnetic scattering amplitudes when the polarized neutron technique is used. Shull also discusses the magnetic electron configuration in Fe_3Al. In his usual informal style W. Hume-Rothery discusses the problem of the transition metals. The occurrence of specific phases is proposed as a basis for an alloy chemistry analysis based on group numbers or electron concentrations. After expressing the opinion that "mathematicians" will not be of much help to the metallurgists in the near future (although he agrees that "Mathematical work must, of course, continue") Hume-Rothery reviews some of the most promising experimental techniques, including soft x-ray spectroscopy, which, perhaps unfortunately, has not received much attention during the last 20 years.

The last three chapters are concerned with alloy chemisty. M. V. Nevitt provides a most complete description and classification of alloy phases of transition metals (including the rare earths) in terms of their composition and crystal structure. Hans Nowotny places special emphasis on alloys of the transition metals with boron, carbon, nitrogen, aluminum, and silicon. These two chapters, with their extensive lists of references, constitute a very complete and up-to-date summary of the crystal structure of alloys that involve transition elements. In the last chapter Leo Brewer states that "Although in principle all the properties of metals should be deducible from the solution of the Schrödinger equation, in practice there is no hope in the foreseeable future that one will be able to deduce properties of a wide variety of metallic systems from first principles alone. Because of the impractibility of the exact quantum treatment of metals one must resort to various simplified models to aid in the correlation of the properties of metals." Brewer then develops his ideas about the application of Pauling's valence bond theory to metals. Brewer stresses N. Engel's contributions to this field and reminds us that Engel's original work was published in Danish (in 1949) because the three most important metallurgical journals published in America—*Transactions of the American Institute of Mining and Metallurgical Engineers, Transactions of the American Society for Metals*, and *Acta Metallurgica*—considered his manuscripts too original and novel and for that reason rejected them.

This book will constitute a very valuable addition to the libraries of students and advanced research workers in the field of alloys.

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Atmospheric Processes

Exploring the Atmosphere. G. M. B. Dobson. Oxford University Press, New York, 1963. 200 pp. Illus. $3.40.

This little book presents a fascinating account of atmospheric properties and processes as they are seen by a scientist whose investigations over four decades have contributed greatly to our understanding of the upper atmosphere. Dobson's objective is quite limited, and it is on this basis that his work should be evaluated. The book consists of a nontechnical account of ten more or less independent atmospheric problems. The topics chosen are, of course, those of particular interest to the author; and this leads to the neglect of large areas of great interest and importance. The book is, nevertheless, self-contained and coherent to a remarkable degree. The organization revealed by the table of contents suggests a hodge-podge, but the author makes a generally successful effort to weave a logical fabric. Dobson has illustrated the fact that what is important in a book or a lecture aimed at a wide audience is the communication of the author's way of thinking about his subject. In this case, the thinking is sound, the emphasis appropriate, the expression lucid, and the link between author and reader strong. An effort to compile a similar book from papers by a number of authors probably would have been a disaster.

The topics discussed are a general picture of the atmosphere; temperature and humidity of the troposphere and stratosphere; temperature and density at great heights; clouds, hail, and rain; thunderstorms; ozone; the sun, sunspots, and solar activity; the ionosphere; the aurora, airglow, and Van Allen Belts; and the geomagnetic field. These complex problems are presented with refreshing clarity and simplicity. It is inevitable in a nonmathematical account that much has been omitted, but con-

siderable attention has been paid to stating difficulties and to giving accounts of partially solved problems.

Dobson's book is recommended enthusiastically to "generalists" who are curious about atmospheric processes and to specialists who feel a nostalgic yearning for an era when their knowledge might have encompassed more of the wealth of natural phenomena. Books like this suggest that the dilemma of the specialist is not hopeless, that we may not be foredoomed to individual explorations of ever-narrowing crevasses of understanding.

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Russian-English Dictionary

Russian-English Chemical and Polytechnical Dictionary. Ludmilla Ignatiev Callaham. Wiley, New York, ed. 2, 1962. $19.50.

A new edition of Callaham's valuable dictionary is good news. It is enlarged, presumably in its coverage of polytechnical terms since that word is now a part of the title. Frankly, I do not consider this title more enlightening than that of the previous edition, . . . *Technical and Chemical.* Neither does justice to the content of this excellent dictionary, which includes botanical and biological terms but is rather weak in purely technical—that is, industrial—nomenclature. The latter is difficult to dig up, since the Russians seem reluctant to admit that factory and mine "jargon" has a place in official terminology and that it usually has equivalents in the languages of the other industrialized countries. Here also we must draw a line between what is considered "technical" and what is preferably left to the general bilingual dictionaries. Thus, should we consider some terms that are scattered throughout Callaham's dictionary part of a "chemical and polytechnical" dictionary? For example, мужик *m.* (peasant, countryman), мундир, картофель в —е *v.* (potato cooked in jacket), комбатант *m.* (combatant), полк (regiment), полиция *f.* (police), кокард/а *f.* (cockade, badge), ресторан *m.* (restaurant), статуя *f.* (statue), онколь *m.* (on call), омлет *m.* (omelet), and thousands of others like these. It also seems redundant in such a compilation to note "(elec.) ohmic," "(med.) onkologist," and the like, though it is perfectly correct to specify "(text.) steep" since to steep tea probably has a different term in Russian.

I have one other quarrel with this work, and this is about its arrangement. The preface states that the dictionary is "intended chiefly for English-speaking scientists and engineers with a *fair* knowledge of Russian." But it requires a grammatical knowledge far from fair. Thus, a root word forms the entry and by means of slashes and dashes followed by suffixes in the text (in grammatical but not alphabetical order) other meanings are given. For example, under this entry "помех/а *f.* interference, disturbance; hindrance, impediment, obstacle; difficulty, trouble, kink," we find in line 5 "служить —ой *v.* stand in the way, —[then] создавать —и *v.* disturb, perturb; —остойкий, оустойчивый *a.*—noise-proof, staticproof; antijamming, interference-free, —офильтр *m.*—noise filter." In the longer entries this is definitely frustrating and impairs the usefulness of this reference work.

The publisher, John Wiley and Sons, deserves high praise for the excellent physical appearance of the dictionary.

M. HOSEN
U.S. Information Agency, Technical Books Exhibit, Moscow, 1963

General Relativity

Gravitation: An Introduction to Current Research. Louis Witten, Ed. Wiley, New York, 1962. x + 481 pp. Illus. $15.

As suggested by the title, and further explained in the editor's preface, this book is intended to provide a reader who has some technical knowledge of the general theory of relativity with a survey of current research. The book consists of 11 chapters written by different authors or teams of authors. The editor provided certain guidelines concerning the arrangement of the material, cross references, and the like, but he wisely refrained from imposing a unified scientific point of view on the authors. The resulting work differs from the usual collection of review articles, or conference reports, in that the editor assigned the individual topics and each author was then given adequate time to prepare his contribution.

The individual chapters deal with these topics: experimental evidence, exact solutions of the field equations, ponderomotive theory, the Cauchy problem of general relativity, conservation laws, gravitational waves, canonical theory, quantization, Rainich theory, geometrodynamics, and cosmology.

The authors are all well-known relativists, and they write, in the majority, on subjects to which they themselves have contributed significantly. This is not to say that the survey provided by this book is "complete" or that the views presented are "authoritative." In the past decade research in general relativity has mushroomed, and many of the areas reported on are controversial. On balance, I believe that the editor has chosen the better way out of the ensuing dilemma; he has permitted each author to develop his subject according to his own lights. What may have been lost in objectivity has been gained in terms of lucid and persuasive presentations. Most of the authors have also indicated their personal approaches in prefatory remarks. Along with other recent survey articles, this book is a most helpful collection, and it will be found on every active relativist's reference shelf.

I have two mild criticisms. The editor, instead of providing an index and a comprehensive bibliography, permitted the authors to conclude each paper with an individual list of references. At the end of the book there is a detailed outline of each chapter, with sections and subsections. This procedure, in my opinion, detracts from the usefulness of the book, but, in the interests of reasonably prompt publication, it was probably unavoidable. My other criticism is concerned with the poor printing job. In many of the mathematical equations, symbols and indices that denote the same type of mathematical quantity have been taken from different fonts, apparently more at random than capriciously. At one point, for instance, an index *s* (lower case) was replaced by a capital letter *S* in the same expression in which *S* also stood for *surface element.* Whether readers find such defects seriously annoying probably depends on the care with which they are accustomed to looking at the details of computational derivations.

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