scale, but this does not necessarily involve a hyper-dense state. The work of Hoyle, van Albada, and Klein and collaborators has shown, so far as I can judge, that nuclei of high atomic weight could also have been formed in essentially present-day stars, without making an over-all high density necessary.

These objections are minor, and one can only be grateful to Couderc for presenting us with such a colorful account of this subject.

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Physics and Mathematics

Cloud Chamber Photographs of the Cosmic Radiation. G. D. Rochester and J. G. Wilson. New York: Academic Press; London: Pergamon Press, 1952. 128 pp. + plates. $10.80.

Professors Rochester and Wilson, of Manchester, England, have been prominent in the development and exploitation of the cloud chamber technique. In the present volume, they give a well-rounded selection of photographs obtained in cosmic ray laboratories all over the world. Explanatory captions are included, but it is characteristic that the elementary principles of cloud chamber operation and particle behavior are not outlined. Indeed, the language of the captions will be meaningful only to those readers well initiated in cosmic ray research.

This is not so of the pictures ,however. They give a refreshing sense of reality to the existence and wonderful behavior of elementary particles possessed with fantastic energy; and persons in many walks of life may be led to feel a vivid appreciation of the extraordinary phenomena portrayed. Such visual comprehension is of great value to research workers, but it is not to be decried in the form it takes in those less fully informed. Even the feeling engendered that one has actually seen cosmic rays, is not unjustifiable, for one senses all objects with essentially the same sort of indirectness.

To a student of cosmic rays a careful reading of the captions, with frequent reference to the pictures under discussion, will be thoroughly rewarding. Mental exercise is required, since the explanations are necessarily abbreviated; but in the interpretation of the pictures here displayed, almost all the known laws of behavior of high energy particles and the properties of practically all the known particles are illustrated and put to use. Thus, following the arguments of interpretation can be of as much educational value as, for instance, the study of the recorded games of experts is to the student of chess.

Many of the pictures were apparently selected for their historical interest. These include the earliest photographs of cosmic rays by Skobelzyn, those of cascade showers by Blackett and Occhialini, the photograph by Anderson, credited with the discovery of the positron, some of the earliest records of mesons and their decay, and the first pictures of V-particles by Rochester and Butler. Such examples are also of educational value, because they demonstrate so effectively the process of discovery.

Other photographs are illustrative of the processes of interaction and transformation that have been studied in the cosmic rays, special emphasis being given to phenomena under current investigation. There are also pictures illustrating the distinctive properties by which different particles may be recognized. And another group of pictures was selected to show characteristics of the technique of cloud chamber operation, together with some of the many variations of apparatus and technique that have been employed for special purposes.

In almost all the commentaries, attention has been called to the technical excellence, or imperfections, of the pictures and the influence of the quality on the interpretation that can be made.

The attention given to the limitations on interpretation in case after case throughout this book leaves one at the end with the feeling that even the cloud chamber, which provides more detailed information about individual cosmic ray events than any other instrument (except perhaps the photographic emulsion), is still so severely limited that the pathway to further knowledge is very hard. For the student this emphasis on the limitations, as well as the powers, of the instrument is essential to provide a proper balance.

In many respects the virtues of the cloud chamber and the photographic emulsion in cosmic ray research are complementary, and both techniques share the virtue of pictorial clarity. In the field of publications, an obvious need is to supplement this fine collection of cloud chamber photographs of cosmic radiation with a similar book exhibiting photomicrographs of representative cosmic ray events observed in photographic plates. The summaries of the interpretations that might accompany such pictures would be of educational value equal to those in the present book and the duplication of subject matter would be so little that every teacher and researcher in high energy physics would want copies of both books on his desk.

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High-Energy Particles. Bruno Rossi. New York: Prentice-Hall, 1952. 569 pp. Illus. $12.50.

"If the past is any guide, theory will probably continue to lag behind the observational approach," says a recent research review. Must the same be said of elementary particle physics? This subject engrosses the greatest concentration of talent in theoretical physics ever seen. All minds work to open the secret door, to reveal the glittering central mechanism, to comprehend in one view the stability of the half-dozen or so elementary particles (Table 1), and the processes which

TABLE 1

ELEMENTARY PARTICLES AND ELEMENTARY FIELDS FOR THE TRANSFER OF ENERGY BETWEEN PARTICLES

		Name	Mass at rest relative to electron	Charge relative proton	Spin	Spontaneous transformation
Particles	Nucleon	proton (p)	1836.14	1	½	Stable
		neutron (n)	1838.65	0	½	$n \rightarrow p + e^- + \nu + 0.77$ mev (12.4 min)
	Electron	positon (e^+)	1	1	½	Stable
		negaton (e^-)	1	−1	½	"
	Meson	$\mu \pm$-meson	209	±1	½	$\mu \rightarrow e + \nu + \nu + 107$ mev (2.1×10^{-6} sec)
		$\pi \pm$meson	276	±1	0	$\pi \rightarrow \mu + \nu + 33$ mev (2.65×10^{-8} sec)
		π^0-meson	266	0	0	$\pi^0 \rightarrow \gamma + \gamma + 136$ mev ($\sim 3 \times 10^{-14}$ sec)
		τ-meson	977	±1	0?	$\tau^+ \rightarrow \pi^+ + \pi^+ + \pi^- + 77$ mev ($> 5 \times 10^{-10}$ sec)
		V_1^0-meson	2200	0	½	$V_1^0 \rightarrow p + \pi^-$ 46 mev ($\sim 5 \times 10^{-10}$ sec)
		Other mesons				
Quanta: mechanisms for the transfer of energy	Electromagnetism: photon (γ)		Propagated with speed of light; zero rest mass	0	1	Stable
	Gravitation: graviton			0	1	"
	Gravitation: neutrino (ν)			0	½	"

create and destroy them. Yet theory continues to lag behind discovery. Every year, on the average, sufficient observations and cases are collected to establish the existence of one new particle. Each new entity has properties that to some minds were new and unexpected, to others appear as random drawings from an infinitude of possibilities.

The methodology for discovery and investigation of the elementary particles, the tools—both experimental and theoretical—that have put the experimentalist so far ahead of the analyst, form the content of this outstanding book by Professor Rossi, of MIT. Well known to most physicists is the sight of this leading cosmic ray investigator opening his brief case to draw out a graph, formula, or table in answer to a colleague's question. These carefully prepared compilations of data and theory now become available to all. Typical examples include: (1) A graph of absolute intensities of the principal components of the cosmic radiation as a function of depth in the earth's atmosphere—useful data at a time when we are showered with new particles more richly from outer space than from accelerators yet a-planning. (2) A collection of the principal well-established formulas for the probabilities for a fast particle to collide with an electron and to radiate, or to undergo, elastic scattering as it passes through the field of force of an atomic nucleus —all these formulas being presented for the several spin values that may occur. The likelihood of these elementary processes depends upon spin of the particle in question, a useful circumstance in the interpretation of the observations. (3) Extensive graphs and tables for the loss of energy of fast particles via ionization in air, carbon, aluminum, iron, and lead. (4) Thorough treatment of the theory of production of pairs of positive and negative electrons by energetic photons, and radiation of new photons by electrons, and of the theory of shower multiplication based on these two processes. (5) Attractively prepared diagrams of the construction and operation of the principal measuring devices, with remarks on their efficiency, reliability, and sensitivity. (6) Extensive tables and graphs on the properties of photographic emulsions and their use in measuring energy, mass, and other characteristics of elementary particles. (7) Summary of much of the existing evidence on the properties of π- and μ-mesons, the principal omissions being only the extensive observations made at Chicago on nuclear scattering of π-mesons in the past few months and the measurements by Keuffel of time for capture of a μ-meson into an atomic nucleus. (8) Comparison between theory and experiment on the electromagnetic interactions of high energy particles (pair production, photon absorption, photodisintegration of the nucleus, ionization, shower production)—all of which goes far to establish the satisfactory status of this part of the subject. (9) Compilation of existing information on the collision of two high energy nucleons, and of the interaction of one such nucleon with a complex nucleus (production of multiprong stars by nucleon emission; production of mesons).

The last chapter constitutes more than a quarter of the book and deals with the part of the subject that

is in rapid development and to which Rossi has made important contributions: nuclear interactions of the cosmic rays. It begins with 40 beautiful and instructive cloud chamber and emulsion photographs of cosmic ray events of most varied character. There follows in tables and graphs an analysis of the statistical data on the particles which emerge from nuclei on bombardment with particles of energies of the order of 10^9 ev. The book concludes with an analysis of the propagation of nucleons through the atmosphere.

This book might well be given an alternative title: "The Elementary Processes of High Energy Physics." In terms of these elementary processes it is appropriate to think of a comprehensive interpretation of cosmic ray phenomena. A second book on this subject is promised by the author. If it is as thorough as the present contribution, an extraordinarily good basis will have been established for further attack on the elementary particle problem.

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Bessel Functions: Functions of Positive Integer Order, Part II. British Association for the Advancement of Science, Mathematical Tables, Vol. X. Prepared on behalf of the Committee for the Calculation of Mathematical Tables by W. G. Bickley *et al.* New York: Cambridge Univ. Press, 1952 (for the Royal Society). 255 pp. $11.00.

This volume, the last of the series of British Association Mathematical Tables, continues the tables given in Volume VI of the series (*Bessel Functions*: Part I: *Functions of Order Zero and Unity*) to functions of positive integer orders up to 20, for various values of argument up to 25 for the J and Y functions, and up to 20 for the I and K functions.

Although this volume has been included in the British Association series, it has been published under the auspices of the Royal Society, whose Mathematical Tables Committee replaced the British Association Mathematical Tables committee in 1948 while this volume was in preparation.

The first 50 pages include, in addition to a preface which lists the members of the committees responsible for the tables, a description of the tables, and a short account of the methods used in calculating and checking them. This section will be of special interest and value to computers. In a section entitled "Functions and Formulae," a list of formulas relevant to the functions tabulated is given. This list is quite comprehensive and greatly enhances the value of the volume. A section on interpolation, showing how values of the functions for arguments between those tabulated may be calculated, is included in the preliminaries. For the 8-figure tables, standard methods, using second differences therein printed, are recommended. Other methods, not depending on differences, and which may be used in the 10-figure tables, are also described.

In recent years two important tables of Bessel functions have appeared, those of Enzo Cambi (Dover Publications [1948]), and the Harvard Tables (Harvard Computation Laboratories, Harvard University Press [1947–51]). In both tables, however, only functions of the J type are given, whereas here almost as much space is devoted to each of the functions of the other three types, Y, I, and K. The following tables are given:

Table I. $J_n(x)$, $n = 2(1)20$, $x = 0(0.1 \text{ or } 0.01)10(0.1)25$; 8 decimals.
Table II. $Y_n(x)$ or $y_n(x)$, $n = 2(1)20$, $x = 0(0.1 \text{ or } 0.01)10(0.1)25$; 8 figures.
Table III. $i_n(x)$ or $e^{-x}I_n(x)$, $n = 2(1)20$, $x = 0(0.1 \text{ or } 0.01)10(0.1)20$, 8 figures.
Table IV. $k_n(x)$ or $e^{x}K_n(x)$, $n = 2(1)20$, $x = 0(0.1 \text{ or } 0.01)10(0.1)20$; 8 figures.
Table V. $J_n(x)$, $n = 0(1)20$, $x = 0(0.1)25$; 10 decimals.
Table VI. $Y_n(x)$, $n = 0(1)20$, $x = 0.1(0.1)25$; 10 figures.
Table VII. $I_n(x)$, $n = 0(1)20$, $x = 0(0.1)20$; 10 figures.
Table VIII. $K_n(x)$, $n = 0(1)20$, $x = 0.1(0.1)20$; 10 figures.

The first four of these tables provide central second differences or modified second differences for interpolation purposes.

The arrangement and printing are excellent; the reviewer has checked a number of entries chosen at random and has found no misprints.

Bessel functions enter into the mathematical solutions of a wide range of scientific problems. The information contained in this volume will therefore be welcomed by, and will greatly assist, many workers in the various fields of science and technology.

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Theoretical Nuclear Physics. John M. Blatt and Victor F. Weisskopf. New York: Wiley; London: Chapman & Hall, 1952. 864 pp. Illus. $12.50.

This excellent book contains a comprehensive treatment of the principal and more important applications of theoretical viewpoints to nuclear physics. It was written at the termination of the period of independent development of classical nuclear physics—i.e., nuclear physics making no use of meson phenomena. It is probable that the next book of comparable thoroughness will be greatly affected in viewpoint and emphasis by the rapid strides that are being made in the field of meson and other high-energy researches, and that its outlook will be appreciably different. The authors and the publishers have contributed to the maintenance of permanent values in science in providing a record of ideas at the approximate termination of the era in which neutron-proton-β information was developing independently of the newer physics.

Blatt and Weisskopf place their main emphasis on the two-nucleon problem, the resonance theory of nuclear reactions, general requirements that can be set on nuclear forces from empirical evidence, multipole electromagnetic radiation, β-ray theory, and shell theory. The mathematics of angular momenta and electromagnetic radiation are discussed in the addenda. The main approach is physical, mathemati-

cal detail being subordinated. There are many carefully prepared diagrams and tables facilitating absorption of the material. The authors' preferences have led to the elimination of some items, such as the theory of hyperfine structure and spectroscopic isotope shift—presumably on the grounds that the atom may be considered as an instrument in the exploration of the nucleus. The theory of stopping power of charged particles is not included. Similarly, the older literature on the 3- and 4-body problems, although quoted, is not discussed in great detail.

It is a pleasure to see moderation regarding a subject so close to Weisskopf's heart as Bohr's "compound nucleus-continuum theory" and caution regarding the fact that, in some cases, experiment indicates the applicability of the independent particle approximation. The probable necessity for the inclusion of surface tension terms in Wigner's uniform density model has not been forgotten. It is reassuring to see a whole section prefaced by the statement "It is possible that the developments of this chapter will soon be obsolete," as has been done in the discussion of saturation of nuclear forces. Indeed it appears increasingly probable that the many body forces that the authors have in mind will become the fashion, the π-meson having been shown to be pseudoscalar.

The reader of a book will always find a few points that he would have discussed differently. The view that high energy n-p and p-p scattering speaks on the whole against charge independence is possibly paying too much attention to the work of Christian and Hart, and of Christian and Noyes, and too little to that of Jastrow, and of Case and Pais. The last two investigations are mentioned, but the pessimism regarding charge independence remains. The recent work of Lévy with the pseudoscalar meson theory appears to strengthen the view of charge independence by providing an explanation for the repulsive core used by Jastrow. In connection with the treatment of the "effective range" the reviewer would have preferred not to single out $E=0$ as necessarily the point around which the expansion should be made. The authors have not completely succeeded in avoiding partiality to the Cambridge mass nuclear physics scene, but the vast accumulation of literature in nuclear physics makes it difficult, of course, not to favor the work among one's acquaintances.

The writer has no enthusiasm for standardization of scattering information in terms of "effective range" and "intrinsic range." The effective range singles out the relative energy $E=0$, which has no better standing than other values of E. The last International Conference on Classical Nuclear Physics at Chicago showed the type of confusion that can arise. The pedagogic value of a presentation of general features is not denied, but for a clear specification of trial potentials the relatively dull, uninspired but unambiguous specification of an interaction term in the Hamiltonian can hardly be improved on.

The reviewer has been especially impressed by the discussion of resonance theory of nuclear reactions. He believes that the authors have emphasized most of the truly essential features of the situation. The chapters on electromagnetic radiation, β-ray theory and shell theory, interrelated through the empirical material, are welcome parts of the survey, combining simplicity of presentation with reasonable exhaustiveness of essential facts. The chapter on β-ray theory could have been more extensive, with more discussion of orbital capture in the light of the work of Marshak and with more attention to the mathematical formalism in general. On the other hand, there are references to most of the relevant papers.

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Theory of Matrices. Sam Perlis. Cambridge, Mass.: Addison-Wesley, 1952. 237 pp. $5.50.

In this volume Dr. Perlis has attempted to put before mathematicians and nonmathematicians a great deal of useful material on matrices, together with detailed proofs and numerous illustrations and problems. Beginning with rectangular arrays and the usual matrix operations and with a discussion of vector spaces (vectors being matrices of one row or column) and the facts about determinants to the theory of congruence, Hermitian congruence, and similarity of matrices, he proceeds to the study of matrices with polynomial elements, of orthogonal matrices, of characteristic roots of matrices, and of linear transformations. Bilinear and quadratic forms are considered in terms of their matrices.

Despite minor errors and causes for irritation, the author is eminently competent to write this book and he has obviously devoted much time and thought to it. I am convinced, however, that he has written the wrong book. Since the same could be said with equal force about other recent textbooks on this subject, it seems worth while to make my point in detail.

The twentieth century might be called a golden age of mathematics. Great advances have been made in many directions. The one that concerns us here, and the one that carries on a great tradition beginning with the geometry of Euclid, is the emphasis upon abstraction for the purposes of unity and simplicity and clarity. The useful principle that has been at work through the years may be illustrated by a trivial observation: If our subject is forests, we cannot but be aware that forests are made up of trees, many and diverse; for some purposes we may want to consider trees in detail, but for others we should ignore the trees and think of the forest. The constant effort to keep focused on the main object has exerted a steady pressure upon the form of the subject matter now before us. During most of the nineteenth century determinants played an important role in algebra, and arrays of numbers occurred only incidentally. In the early part of the present century arrays assumed a new aspect, as matrices, and began to be studied vigor-

ously, particularly after the fundamental papers of Wedderburn in the first decade. The reign of the matrix was clearly at its height when MacDuffee's *Ergebnisse* tract appeared in 1931. It was then apparent that determinants had assumed a lesser place and were to be considered as occasionally useful, sometimes essential, but best avoided whenever possible. It is my conviction that, in 1953, matrices too must be regarded as of subsidiary importance.

When geometry was enriched at the hands of Descartes by the introduction of coordinates, it was also impoverished in a way that has now become quite clear. Coordinate systems, after all, are always special, and must be chosen with great care if they are not to complicate the problem under consideration. This point is well illustrated by the vector of physics. Such a vector is not a set of three components but an entity in its own right, and much can be gained by acting on this truth. Similarly, in connection with the general notion of a vector space, which has application to many widely separated parts of mathematics, vectors should not be considered as sets of numbers. Here is the first point on which many active workers in modern algebra, topology, and analysis will be inclined to take issue with Perlis. I am equally sure that the mathematical layman, when introduced to vector spaces in abstract terms enriched and illustrated by diverse concrete examples and problems, would find himself impatient with the older points of view. The matrix would then turn up as a subsidiary notion in two different connections: (1) as the set of "components," with respect to specified bases, of a linear transformation from a vector space into a (possibly different) vector space; (2) as the set of values of a bilinear form corresponding to the basis vectors. The reduction of a matrix to a canonical form would be considered as simply an alternative and somewhat awkward approach to the problem of selecting a basis of a vector space (or bases of two vector spaces) connected in an intrinsic way with a given linear transformation or a given bilinear or quadratic form. The determinant of a matrix could not and would not be neglected, but it could be presented as the determinant of a linear transformation, or as a relative invariant of a bilinear form, or as a skew-symmetric n-linear form on an n-dimensional vector space. The object would be not to overwhelm or to confuse, but to put first things first. And the gain in unity, in simplicity, in clarity, and in power would be immense.

The above remarks are directed not to Dr. Perlis, who certainly needs no introduction to modern algebra, but to the many mathematical laymen who are finding matrices useful in their work. Elementary textbooks on matrices are being written in answer to the demand of a wide public; a better-informed demand would encourage the same writers to produce even more useful books.

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Ferromagnetic Properties of Metals and Alloys. K. Hoselitz. New York: Oxford Univ. Press, 1952. 320 pp. Illus. $8.00.

This book is a valuable contribution to the existing literature on ferromagnetism—particularly for the reader who is interested in the subject from a metallurgical, rather than a purely theoretical, point of view. The book takes up the magnetization curve in some detail, reviewing the various processes that take place in a magnetizing field and summarizing results and conclusions applicable to both magnetically hard and magnetically soft materials. A chapter is devoted to metals and alloys and the preparation of specimens for test. Another is devoted to magnetic analysis and the information regarding the condition of a test specimen obtainable from magnetic data.

In its 300-odd pages the book gives a good first look at the main areas of current interest. It is not exhaustive in its review of fundamentals, nor encyclopedic in its review of detail. It is readable, it gives many useful references, and it is up to date, particularly in the spheres of special interest to its author.

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Structure of Metals: Crystallographic Methods, Principles, and Data. 2nd ed. Charles S. Barrett. New York–London: McGraw-Hill, 1952. 661 pp. $10.00.

In this second edition Dr. Barrett has retained the original logical outline and concise readable style for which his first edition was distinguished. Many sections are devoted to elementary fundamentals, and this book will serve as an excellent introductory text on crystallography and x-ray metallography for senior and first-year graduate students. The omission of problem sets appears to detract somewhat from the value of the book as a student text. No course in crystallography or x-ray metallography, however, is entirely satisfactory without the inclusion of a judiciously formulated series of laboratory exercises. And such exercises, giving emphasis to the topics of greatest importance to the instructor's objectives in his specific course, are readily based on the context and very valuable appendices in this book.

The coverage of techniques, especially those for x-ray metallography, is quite complete. One chapter is devoted to electron diffraction techniques. All sections are amply documented with references, thus giving the more enterprising students additional stimuli and ready access to the more detailed analyses provided by the original literature.

Barrett's book also serves as an important and ready reference for research investigators and experts in the field. It contains a rather complete discussion of the more advanced techniques, as well as analyses and interpretations of the existing data, on such topics as electron theory of metals, plastic deformation, dislo-

cation theory, structure of cold-worked metals, preferred orientations, anisotropy, and phase transformations. Many of these sections can be adapted for more advanced graduate student instruction.

Many revisions were made in this new edition, and the context of the first edition was increased by over 90 pages. The major changes were made on sections dealing with dislocations, imperfections, creep, structure of metals, textures and preferred orientations, precipitation hardening, and phase transformations—necessitated by the additional knowledge acquired in these fields since the publication of the first edition in 1943.

As it is now revised, Barrett's book is the most inclusive and up to date single reference that is available on the structure of metals.

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Chemistry and Biochemistry

Chemistry of Carbon Compounds*: *Aliphatic Compounds, Vol. I, Pt. B. E. H. Rodd, Ed. Amsterdam–Houston: Elsevier, 1952. 684 pp. $17.50.

This book is a continuation of the excellent work which was published in 1951 (SCIENCE, 116, 181). The style is essentially the same as that used in the last half of Part A. The tremendous task of editing this treatise was made easier by the distinguished advisors: Sir Robert Robinson, J. W. Cook, R. D. Haworth, Sir Ian Heilbron, E. L. Hirst, and A. R. Todd.

There are 13 authors of the 12 chapters, several of whom have contributed to more than one chapter. The principal classes of aliphatic compounds covered are monocarboxylic acids and carbonic acid, dicarboxylic acids, polyhydric alcohols and their derivatives, complex carbohydrates, proteins, and enzymes. A particularly extensive treatment is given to polyhydric alcohols, covering 275 pages. Generally, methods of preparation and properties characteristic of the class of compounds are presented briefly at the outset of the chapter. This is followed by methods of preparation and properties of individual members of the class of compounds and derivatives.

This reference work will fall between such widely used treatises as Richter, Karrer, and Gilman, and the more extensive Beilstein and Elsevier in degree of treatment of the subject matter. The style of presentation by classes and compounds within classes is similar to Beilstein.

It appears that this will be an invaluable series of books for the organic chemist. The treatise is far too voluminous for a textbook; it will find its widest use as a reference book. The subject matter is up to date and is presented in a modern, comprehensive manner. It is strongly recommended for every qualified organic chemist.

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Metabolic Maps. Wayne W. Umbreit. Minneapolis: Burgess Pub., 1952. 439 pp. Illus. $6.00.

From the introduction to the appendix, the author endeavors to present a summation of our present knowledge of the mechanisms of cellular metabolic functions. For the purposes of presentation, this objective is exceptionally well accomplished by dividing cellular biochemistry into logical subdivisions and, in workbook fashion, covering each individual reaction by means of a series of nicely executed charts, together with carefully selected references for each of the reactions diagrammed. The references include review articles, the historically important papers, and the most pertinent of the 1950–51 literature.

An excellent balance among the general fields of metabolism is achieved by allocating the first five chapters to the subject of carbohydrate oxidation and its related phosphate metabolism; Chapter 6 to oxygen transfer; Chapters 7 through 10 to nitrogen metabolism, including methylation (Chapter 9) and ring-containing amino acids (Chapter 10); Chapter 11 to nucleic acids and their derivatives, and Chapter 12 to the lipids, including the latest in the enzymatic synthesis of biologically important steroids.

The make-up of the book, with its inclusion of blank space for additions and changes as they appear in the literature, permits the reader to use it in accordance with the author's suggestion as "a device for the orderly assemblying of useful contemporary information without employing extensive files."

The author has endeavored to help the reader keep abreast of the broader fields of cellular metabolism. An example of how he does this and, at the same time, gives the book practical value to readers unacquainted with a specific field, is the cryptic but clear section devoted to the nomenclature of steroids. Likewise, a few pages and references on the subjects of purine and pyrimidine antagonists will be found.

The subject index is complete and especially valuable in that many of the chemical substances involved as intermediates in the various metabolic pathways are listed.

It is the opinion of the reviewer that this book will be useful, not only to those active in the field of cellular metabolism, but also as a general source of information to all those interested in modern biology.

EDWIN E. HAYS

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Chemistry of the Metal Chelate Compounds. Arthur E. Martell and Melvin Calvin. New York: Prentice-Hall, 1952. 613 pp. Illus. $10.00.

Recent years have witnessed a great resurgence of interest in inorganic chemistry, as is evidenced by the fact that the demand for inorganic chemists in industrial and academic institutions now far exceeds the rather modest supply. Although all areas of inorganic chemistry have enjoyed this rapid growth, the metal complexes have attracted particular attention, and