

the Atomic Energy Commission. The resultant compact volume is authoritative, having been written and edited by members of the staff at the Oak Ridge National Laboratory, a center where an enormous number of radiochemical analyses has been performed. The book is intended to provide the uninitiated with sufficient information for him to plan and commence operation with only limited direct assistance from experts. Clearly not all relevant material could be included in a relatively small guide, and the authors have restricted the more detailed discussions to those subjects that have been incompletely treated in other compilations or have been discussed primarily in scientific journals and reports. Nevertheless, appropriate lists of references are provided throughout.

Although most of the chapters in the book have been written by different authors, the subject has been approached in a systematic and consistent manner. To indicate the arrangement it is convenient to list the titles of the different chapters: (1) "Basic Nuclear Properties and Activation Analysis," by Harley H. Ross; (2) "Reactor Neutron Flux: Characteristics and Uses," by Frank F. Dyer; (3) "Nonreactor Neutron Sources," by James E. Strain; (4) "Radiochemical Separations," by Harley H. Ross; (5) "Radiation Detectors and Counting Statistics," by Richard L. Hahn; (6) "Scintillation Counting Techniques," by James S. Eldridge; (7) "Present Byways and Future Trends in Activation Analysis," by William S. Lyon, Jr.; and (8) "Practical Examples of Activation Analysis," by E. Ricci.

There are two appendices. Appendix A tabulates the theoretically calculated sensitivity for each element and also concentrations of the element found in a wide variety of materials. Copious references to the original investigations are listed. Appendix B presents a brief general survey of safety measures and licensing requirements.

Some features of the book deserve particular mention:

The energy distribution of neutrons in reactors and flux monitoring are dealt with in greater detail than in other books on activation analysis.

A realistic appraisal of the use of 14-Mev. neutron generators is made and limitations as well as advantages are clearly presented.

Brief information regarding the use of semiconductor detectors is given. Although such solid-state devices may not be very useful in activation analysis at present, they possess potential for future development.

The applicability of NaI(Tl) crystal scintillation spectrometry in activation analysis is well illustrated, and factors governing the choice of a multichannel analyzer are given.

In Chapter 8, four well-chosen examples of activation analysis are dealt with in detail. Relevant calculations are presented in full, and the account provides the beginner with a clear insight into "how it is done."

The general standard of the book is high and it would be invidious to select points for criticism. However, I consider that the principle of substoichiometric separations should have been discussed (in Chapter 4). Also, the extension of gamma spectrometry by the use of coincidence techniques could have been mentioned with advantage in Chapter 6.

The printing and production of the volume are good. Proof-reading has been done quite well. (It is perhaps ironical that on page 12,  $Mg^{28}$  has been written for  $Mg^{24}$  in a subsection headed Errors!)

All persons who are concerned with activation analysis should be glad to possess a copy of this book.

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**The Nuclear Properties of the Heavy Elements. Volume I. Systematics of Nuclear Structure and Radioactivity. Volume II. Detailed Radioactivity Properties. Volume III. Fission Phenomena.** I and II by EARL K. HYDE, Senior Chemist, and ISADORE PERLMAN, Associate Director and Professor of Chemistry, Lawrence Radiation Laboratory, University of California, Berkeley, and GLEN T. SEABORG, Chairman, U. S. Atomic Energy Commission, Professor of Chemistry, University of California, Berkeley. III by EARL K. HYDE. Prentice-Hall, Inc., Englewood Cliffs, N. J. 1964. I: xv + 407 pp. 16 × 23.5 cm. \$15.00. II: xvi + 698 pp. 16 × 23.5 cm. \$25.00. III: xviii + 519 pp. 16 × 23.5 cm. \$18.00.

The understanding of the properties of nuclear matter is expanding rapidly, paralleling the increasing multiplicity of available high-

speed digital computers and nuclear particle accelerators. The literature on any given topic, as in most fields, tends to be spread in bits and pieces throughout a variety of journals, and to make a bad situation worse, a large amount of significant work is to be found only in laboratory reports which are never quite submitted for publication. The three volumes under discussion represent an attempt to correlate and integrate all the pieces of information, both theoretical and experimental, pertaining to the nuclear properties of the heavy elements; the authors have succeeded in providing a good perspective and in an authoritative manner.

Volume I reviews nuclear stability and nuclear mass equations, the independent particle model, the unified model, and theoretical models of  $\alpha$ - and  $\beta$ -decay. The experimental knowledge of these processes is summarized, and the strengths and weaknesses of various theoretical treatments are illustrated with respect to the available experimental data. Volume I concludes with a discussion of general methods of synthesis of radioactive isotopes.

Volume II concentrates on an isotope-by-isotope summary (historical review, methods of synthesis, nuclear properties) of all isotopes of  $Z \geq 82$ . Not having any favorite isotopes to look up, the reviewer found the chapters on applications of heavy elements to geochronology and on synthesis of the transuranium elements of particular interest.

Volume III starts with a review of several models used to explain certain aspects of nuclear fission, followed by a quite complete summary and correlation of existing data on low, moderate, and high-energy fission, including fission induced with complex particles, mesons, and photofission. In keeping with the thorough and logical correlation provided by the authors, an excellent discussion of spallation mechanisms is also included in Volume III.

The material is presented in a logical sequence; the text has been skillfully woven with a profusion of lucid tables and plates to give "The Nuclear Properties of the Heavy Elements" an uncommon clarity of expression. The documentation is superb.

The authors have succeeded admirably in providing a perspective of the historical development and present understanding of certain features of nuclear matter, as well as pointing out the open problems for future solution. The reviewer looks forward to using Volumes I and III as supplements to the text in his nuclear chemistry course; all three volumes are invaluable as references for chemistry, physics, geology, or radiation biology research libraries.

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**Experimental Chemotherapy. Volume III. Chemotherapy of Bacterial Infections. Part II. Chemotherapy of Fungal Infections. Chemotherapy of Rickettsial and Viral Infections.** Edited by R. J. SCHNITZER, formerly Chemotherapy Department, Hoffmann-LaRoche Inc., Nutley, N. J., and FRANK HAWKING, Division of Chemotherapy and Parasitology, National Institute for Medical Research, London. Academic Press, Inc., 111 Fifth Ave., New York, N. Y. 1964. xviii + 647 pp. 16 × 23.5 cm. \$22.00 (until Dec. 31, 1964); \$25.00 (thereafter).

It can be predicted with considerable assurance that any chemist or biologist who is seriously interested in chemotherapy will find Volume III, as well as Volumes I and II of this outstanding series, irresistible. The series is outstanding because in it the wealth of otherwise widely scattered information on all important aspects of experimental chemotherapy has been collected, classified, condensed, described in meaningful fashion, and made readily retrievable by means of excellent subject indexes. In recent years, many first rate reviews of the chemotherapy of infectious diseases have appeared and several reviews on the characteristics and uses of specific groups of chemotherapeutic agents have been published. All of this material, and much more, has now been crystallized in three handy volumes. Nowhere else can one expect to find so much information on so many aspects of experimental chemotherapy in such concentrated form. Every medicinal chemist needs these books on his main shelf. The distinguished editors, the authors, and the publishers of this series all merit the highest commendation for a job well done.

In the first volume, parasitic diseases (protozoan and metazoan) were covered by eighteen chapters on the chemotherapy of specific kinds of infections, along with four ancillary chapters on historical aspects, toxicology, statistics, and "drug resistance." In the second volume, the chemotherapy of bacterial infections was dealt with,

in part, by five chapters on specific kinds of agents (dyes, sulfas, nitrofurans, etc.), by two chapters on the chemotherapy of tuberculosis and leprosy, and by three chapters on general subjects (mode of action, strategy and tactics, and microbial resistance). Two-thirds of the third volume completes the subject of antibacterial chemotherapy with eight chapters on specific kinds of antibiotics, and with discussions of enzyme profiles, nonspecific resistance, and the chemotherapy of *Mycoplasma* infections (one chapter each). In addition, Volume III contains discussions of the chemotherapy of fungal infections (systemic and dermatophytic) in two chapters and the chemotherapy of rickettsial and viral infections (one chapter each).

The volume under review here is an especially attractive one because it deals with most of the rare gems of the golden age of chemotherapy (the penicillins, streptomycin, the tetracyclines, chloramphenicol, erythromycin, polymyxin, griseofulvin, nystatin, amphotericin B, 5-iododeoxyuridine, and thiosemicarbazones of isatin). This book is not the closely knit product of a single hand, but rather a compilation of fifteen authoritative articles prepared by working authors who were able to draw on their own extensive experiences for important relevant information on antibacterial, antifungal, antirickettsial, or antiviral chemotherapy. The book is based on more than 2400 references. In describing each kind of chemotherapeutic agent, the authors have classified their material under headings which outline the development of a drug from its discovery to its use in clinical medicine. As a result, the reader finds a condensed account of each drug: its discovery, isolation, and identification; its chemical, physical, chemotherapeutic, pharmacological, and toxicological properties; its mode of action; its status with respect to the ubiquitous problem of microbial resistance; its performance in clinical medicine; in short, all the knowledge that's fit to know about each drug. In several cases, the information has been critically reviewed and greatly concentrated.

The emphasis in this book is on biological phenomena. Students and teachers of biology, microbiologists, pharmacologists, organic chemists, and biochemists will all find much of interest in the lucid, instructive, and stimulating discussions and penetrating analyses of chemotherapeutic interactions among drugs, bugs, and infected hosts. The excellent bibliographies and the subject index make it possible for the expert to check quickly references and information on any specific agent, from ABOB to Zymosan. The index will also be very useful to those who seek a general survey of the current status of chemotherapy with any particular group of therapeutic agents, or for any particular group of infectious agents.

There are remarkably few typographical errors (only six were noted) and omissions in this book. The errors are minor. For example, the discovery of aureomycin is assigned to "Duggan, 1948" on page 71, and a middle initial is conferred upon Hans Zinsser on page 626. As for omissions, the editors should be warmly congratulated for omitting a chapter on the synergistic action of chemotherapeutic agents, since, as T. D. Brock reminds us on page 132, reports of synergistic action "have little meaning because of the difficulties of defining synergism (Loewe, 1953)." Apparent contradictions and questionable conclusions occur, but, again, these are rare and relatively unimportant. As an example, erythromycin is described as inactive against *E. coli* on page 178, yet *E. coli* is cited on page 182 as the bacterial model for mode of action studies on this drug. Also, one can easily disagree with the conclusion (p. 515) that the discovery of the effectiveness of *p*-aminobenzoic acid in rickettsial infections was "the result of the rational approach via

metabolite interference" (if anything, this was the rational approach in reverse).

Not unexpectedly, one finds considerable variation, from chapter to chapter, in style and quality of treatment of subject matter. Six of the chapters will probably be rated excellent by all discriminating readers. The treatise on penicillins (L. P. Garrod) is comprehensive and critical, and it teaches all one needs to know about all of these compounds, synthetic and natural. In his chapter on polypeptides of the polymyxin group, B. S. Schwartz describes fully, clearly, and quite accurately the discovery, development, and usefulness of these agents. A. H. Campbell's compact essay on dermatophytes is the most instructive exposition on the chemotherapy of dermatophytic infections known to this reviewer. T. D. Brock's chapter is nearly faultless—a thoughtful, critical, extremely useful review of chloramphenicol—with meanings, like meat from a nut, pried out of every relevant report—written in sharp, crisp language, to the point, and then on to the next point. Ludwik Angstein's article is virtually a short course in rickettsiology—the rickettsia, rickettsial diseases, and antirickettsial chemotherapy are all described in an exceedingly detailed, learned, and fascinating fashion. In his excellent chapter on the mode of action of tetracyclines, F. L. Jackson gives us a penetrating analysis of all work on this subject through 1963 and concludes, by elimination, that the primary action of these drugs is probably an interference with protein synthesis. (An interesting illustration of the currently swift progression of biochemical descriptions of biological phenomena is the fact that Jackson's conclusion, published in 1964, has already been carried far forward by three papers, also published in 1964. One of these, by J. H. Hash, M. Wishnick, and P. A. Miller, supplies the final proof that the primary action of tetracyclines interferes with protein synthesis. The other papers, by T. J. Franklin and by A. I. Laskin and W. M. Chan, pinpoint the site of this action.)

There are adequate reviews of all of the important information on all of the experimental chemotherapeutic aspects of the tetracyclines (M. Barber), the macrolides (W. E. Grundy), ristocetin and vancomycin (J. W. Lightbown), novobiocin (P. E. Macey and D. F. Spooner), paromomycin (M. W. Fisher and P. E. Thompson), and the treatment of systemic fungus infections (R. Brown). Under appropriate headings, a more or less complete recital of details of experimental conditions and test results is given for each study with each drug. In addition, clinical applications are briefly described. A chapter on the mode of action of streptomycin opens with an excellent discussion of principles on which to base a general approach to mode of action studies. This is followed by a detailed account of mode of action studies on streptomycin from which no definite conclusions can be drawn. The chapters on nonspecific antibacterial action and on enzyme profiles seem to be, at least, out of place in a book of this kind.

A chapter on chemotherapy of viral diseases (R. J. Pienta and V. Groupé) contains interesting information and an excellent bibliography and is most useful when used in conjunction with the subject index. At the end of the introduction to this final chapter in Volume III of "Experimental Chemotherapy," the reader is advised (well-advised) to "see also the recent survey by Thompson." Thompson's survey appears in Volume I of "Advances In Chemotherapy," a new series edited by A. Goldin and F. Hawking, also published in 1964, by Academic Press.

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